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THE COMMERCIAL CAR JOURNAL

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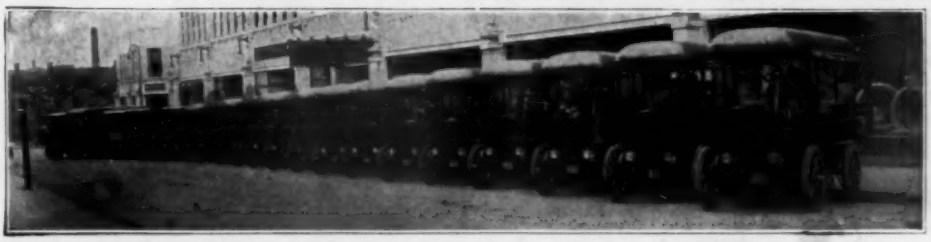


A fleet of 24 Baker Electric Trucks in Cleveland Delivery Service

Their Higher Price Means Lower Cost of Operation

The Baker Electric Truck costs a little more to purchase, but every extra dollar is accounted for specifically in superior construction, more labor, better material. It represents not only more truck value for the money, but more service value. The difference comes in easier operation, lower cost, longer life. These savings run into money in a ten year period of truck operation—easily ten times the additional price of a Baker Truck. Hence its much greater economy in the end.

Additional Cost of Manufacture Itemized in Following Percentage Figures:

Control Lever Located on Steering Post. Controller Enclosed in Dust Proof Cast Aluminum Box —2%

Springs of Specially Toughened Steel. Shackle Bolts Bronze Bushed —1%

Locked Spoke Wheels—Oversize Tires —2%

Front and Rear Axles Stronger —1%

300% Overload Capacity Motor. Driving Chain Runs in Bath of Oil—50% Wider Sprocket of Hardened Steel —2%

Two Sets of Double Brakes. Pressed Steel Chassis Frame —2%

Complete Equipment Without Extra Cost—2%

More Exact Machining and Better Material 1½%

TOTAL—13½%

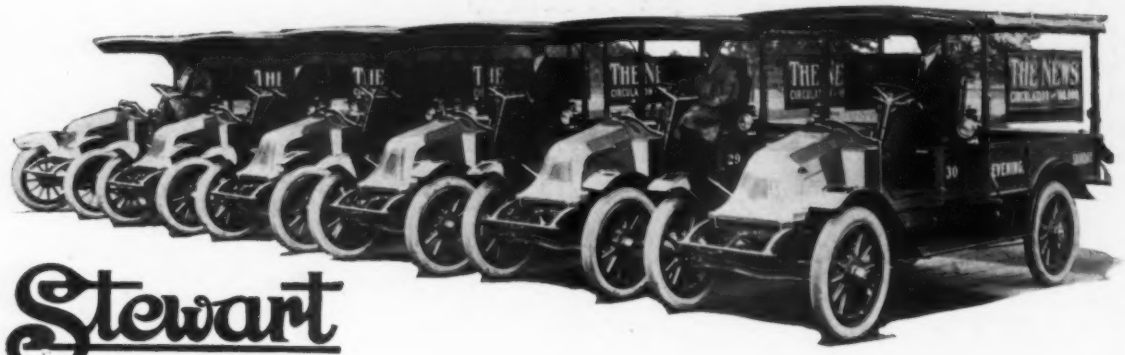
Some of these superior features are found in other trucks; but in no other truck than the Baker are they all found in equal degree. Hence the higher price of Baker Trucks which is not considerable, the lower cost of Baker operation which is very considerable.

THE BAKER MOTOR VEHICLE CO., CLEVELAND

PUBLISHED THE 15TH OF EACH MONTH

CHILTON COMPANY

MARKET & 49TH STS. PHILADELPHIA



Stewart
Delivery Trucks

Delivering the Goods in More than 60 Lines of Business

In more than 60 lines of business in over 80 cities Stewart Delivery Trucks are serving daily—and delivering the goods. They are doing it in scores of American cities, in Canada, in South America. They are proving their economy on the level streets of New York, of Buffalo, of Los Angeles, and in the hilly sections of Albany, of Montreal, of Baltimore.

To be used in more than 60 different lines of business is a record unusual in the light delivery field. The reason the Stewart holds this record is because the Stewart is properly designed, built by experienced makers, soundly financed and ably managed.

Here are a few of the businesses where the Stewart is making good:

Bakers
Banks
Butchers
Caterers
Cigars
Department Stores
Dyers and Cleaners
Fire Departments
Fish and Game
Florists
Furniture
Grocers
Hardware
Ice Cream
Laundries
Liquor Dealers
Mail Service
Newspapers
Park Commissions
Provisions
Street Railways
Telephone

Each of these businesses requires a light truck that covers the ground quickly—covers a lot of ground—and "gets there" on time. In each the satisfied customer is important.

A Word With Dealers

A good delivery truck for the merchant to buy is, naturally, a good truck for the dealer to handle. And remember, too, that the opportunity today, for user and dealer alike, lies in the delivery truck of moderate size and price.

Such a delivery truck is the Stewart, 1500 lbs. capacity, chassis price, $1500. There is *five times* the field for the Stewart that there is for the heavy-duty truck.

Perhaps you are located in open territory. We have factory facilities for prompt delivery. Write for literature.

Stewart Motor Corporation, Buffalo, N.Y.

T. R. LIPPARD, Pres. and Mgr. R. G. STEWART, V. P. and Chf. Eng.
R. P. LENTZ, Sec. and Treas.

Stewart Selling Agencies in the Following Cities:

Albany, N. Y.
Allentown, Pa.
Akron, Ohio
Asbury Park, N. J.
Auburn, Me.
Boston, Mass.
Bridgeport Conn.
Buenos Aires, S. A.
Calgary, Can.
Cleveland, Ohio
Columbus, Ohio
Dedham, Mass.
Fall River, Mass.
Ft. Plains, N. Y.
Galveston, Texas
Glens Galls, N. Y.
Grand Rapids, Mich.
Hamilton, Ont.
Hartford, Conn.
Herkimer, N. Y.
Houston, Texas
Hudson, N. Y.
Johnstown, N. Y.
Kingston, N. Y.
Los Angeles, Cal.
Medicine Hat, Alta.
Miami, Fla.
Montreal, Que.
Newark, N. J.
New York, N. Y.
Newburgh, N. Y.
Northampton, Mass.
Oakland, Cal.
Omaha, Neb.
Ottawa, Ont.
Philadelphia, Pa.
Pittsfield, Mass.
Plymouth, Pa.
Portland, Me.
Portland, Ore.
Providence, R. I.
Poughkeepsie, N. Y.
Reading, Pa.
Rochester, N. Y.
Red Bank, N. J.
San Francisco, Cal.
Spokane, Wash.
Schenectady, N. Y.
Springfield, Mass.
Seattle, Wash.
Salem, Mass.
Savannah, Ga.
Tacoma, Wash.
Troy, N. Y.
Trenton, N. J.
Toronto, Ont.
Vancouver, B. C.
Victoria, B. C.
Watertown, N. Y.
Wilmington, Del.
Washington, D. C.
Winnipeg, Can.
Yonkers, N. Y.

THE PUBLISHERS' PERSONAL PAGE

"He Does Not Believe, Who Does Not Live According to His Belief"

Owing to a temporary financial stringency and the fact that a few banks closed down on certain automobile credits, has apparently caused some to lose faith in the commercial car industry. "Faith is the substance of things hoped for, the evidence of things not seen," so "faith" is really not the word to use in this connection, because we have the evidence of things actually seen to prove the permanency and the future of the commercial car industry.

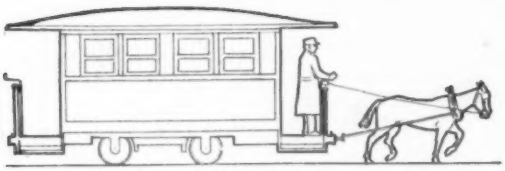
Phenomenal Increase in Trucks and Truck Use

Those who have the ability to look into the future, not only predict things hoped for, but things which they know must take place. The bulk of the world's goods are just as surely to be transported by power, as that our factories, our railroads, our street cars, are motor-driven, and that all other work as far as possible is being done by power, rather than by manual effort.

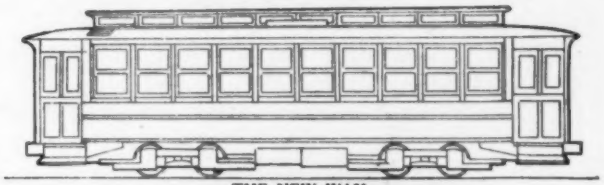
Growth Shown by Statistics

Take for instance the recent statistics of the city collector of Chicago. These show that in spite of the enormous growth of trucking in the city of Chicago during the last three and a half years, there are now four thousand fewer horse-drawn vehicles, and that during this time there has been the phenomenal increase in the use of motor-driven trucks of **four hundred per cent.** In the face of such facts, how can anyone for a moment question the substantiality, the permanency or the future of this growing industry?

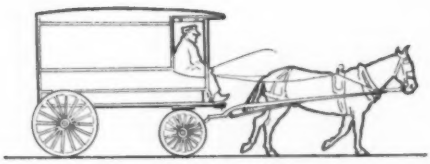
Modern Values



THE OLD WAY



THE NEW WAY



THE OLD WAY

THE NEW WAY—THE AUTOCAR

Prepare for New Business in 1914—with Business-Getting Equipment

New Autocar Delivery Vehicle

Important Features in the New AUTOCAR Motor Delivery Vehicle make for 18% greater pulling power at less operating cost, and consist chiefly of the removable unit of compound full-floating rear axle with special gear ratio reduction, an improved motor oiling method, a simplified clutch action, and an increased water distribution of the cooling system.

Our Unit System of Construction permits a reconstruction from time to time which always keeps the AUTOCAR young. AUTOCARS *never grow old*. Rebuilt AUTOCARS four years old bring 60% of the price of our new chassis.

The Autocar's Unusual Price was determined upon after a careful manufacturing analysis, and the desire to place the AUTOCAR within the reach of all concerns who were in search of a delivery vehicle built for daily use year in and year out and capable of operating in all seasons and applicable to every line of business.

The Autocar Company started manufacturing their product along consistent lines and are now reaping the reward of their early painstaking efforts of building a vehicle from the ground up for a wide field of Commercial use.

VALUE OF AUTOCAR DELIVERY SERVICE

The old horse car has been abandoned because it was inadequate to handle, first, the increasing number of daily riders, and second, because of its unfitness to cover distances in the shortest possible time. The trolley car has eventually replaced this antiquated service, which is appreciated by everybody.

In a similar relation, the AUTOCAR'S VALUE as a delivery car can be compared with the value of the horse-drawn delivery vehicle; while upon a superficial comparison the horse may represent the cheaper mode of transportation, after serious investigation the AUTOCAR demonstrates its greater economy and serviceability.

Therefore, the inferior element which enters into the comparative value of the horse car versus the trolley is also applicable to the horse delivery versus the AUTOCAR for delivery use. The answer of values in time and distance is too apparent for further comment.

MOTOR DELIVERY CAR SPECIALISTS

The Autocar Company, in 1907, realized the value of this time-saving element of the automobile, and started in that year to specialize in building a commercial car, applying their experience in manufacturing power vehicles since 1897. While it would have been cheaper for them to take the four-cylinder motor pleasure car and transform by a simple process their entire plant for the manufacture of this type of vehicle, instead they studied the subject thoroughly, and only after serious consideration were they convinced that a Commercial car should be built from the ground up. That their policies are correct is evidenced by the universal use made of AUTOCARS by firms whose names are household words, and whose business judgment it is reasonable to expect as being sound and practical.

1300 of the Country's foremost Merchants own from 1 to 188 AUTOCARS each, which leaves no doubt but that the AUTOCAR must possess points of superiority over the horse which admit of no dispute.

Get all the facts of the new **1914 Autocar** in new literature just out. Send today for the book, **"A Practical Talk About a Practical Vehicle,"** and other facts and information will be included.

The Autocar Company

Ardmore, Pa.

ESTABLISHED 1897

MOTOR DELIVERY CAR SPECIALISTS

The Commercial Car Journal

VOLUME VI PHILADELPHIA, JANUARY 15, 1914 NUMBER 5

OUR BUYERS' INFORMATION NUMBERS

In this issue, which is named the Eastern Buyers' Information Number, we print a comprehensive review of the commercial motor cars built in Ohio and the States east of Ohio. This review gives the main specifications of every commercial car produced in quantities in these States, and it is intended to take the place of the Eastern National Commercial Vehicle Show, which this year has been discontinued. It also takes the place of "Commercial Car Specification Hanger" which we have issued annually heretofore. We regard it as somewhat of an improvement upon the "Specification Hanger" as the cars are illustrated and grouped according to carrying capacity, and they are also indexed both according to the name of the maker and according to the price of the car.

The cars manufactured in the western section of the country will be shown similarly in the February issue of the COMMERCIAL CAR JOURNAL, which will be known as the Western Buyers' Information Number. These two issues taking the place of the western and eastern National Shows, will show the entire production of commercial car manufacturers in the United States. They will, of course, cover the ground a great deal better than the National Shows because of the fact that every car manufacturer is represented, whereas only about one-half or two-thirds of the manufacturers exhibit at the shows. These numbers should be very valuable to our readers, as they are arranged in a very convenient form for ready reference.

We expect to make these numbers annual features of our publication, and we ask for criticisms of the plan, and suggestions as to its improvement. We would also like to know whether the time of year is best from our readers' standpoint.

FORD EMPLOYEES SHARE PROFITS

The Ford Motor Company has inaugurated the greatest revolution in the matter of rewards for its workers ever known to the industrial world. At one stroke it has reduced the hours of labor from nine to eight per day, and has added to every man's pay a share of the profits of the company. The smallest amount to be received by any man, 22 years of age and upwards, will be $5 per day. As each round of the ladder of industry is reached, every man on that round will have increases in salary in proportion. Young men who are supporting families, widowed mother, smaller brothers and sisters, will be treated the same as those over 22 years. It is estimated that over $10,000,000 will be thus distributed over and above the regular wages of the men.

ELECTRIC STORAGE BATTERY COMPANY, Philadelphia, Pa., for the last six years has given an "Exide" dinner as one of the social features of the Chicago Automobile Show. This year this dinner will be held on Wednesday, January 28th, at the Mid-Day Club.

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ELEVENTH ANNUAL MEETING OF THE MOTOR AND ACCESSORY MANUFACTURERS

There was a very representative attendance of members at the eleventh annual meeting of the Motor and Accessory Manufacturers held at the Waldorf-Astoria on January 7, at 3 P. M. Messrs. J. H. Foster, of the Hydraulic Pressed Steel Company; H. E. Raymond, of the B. F. Goodrich Company; T. J. Wetzel, of the Spicer Manufacturing Company, and C. W. Stiger, of the Stromberg Motor Devices Company; were re-elected members of the Board of Directors to serve for three years. At a meeting of the Board of Directors held on January 8th, the following officrs were re-elected to serve for the ensuing year; J. H. Foster, president; F. Hallett Lovell, Jr., of the Lovell-McConnell Manufacturing Company, vice-president; C. E. Whitney, of the Whitney Manufacturing Company, second vice-president; F. C. Billings, of the Billings & Spencer Company, third vice-president; L. M. Wainwright, of the Diamond Chain & Manufacturing Company, treasurer; Alfred P. Sloan, Jr., of the Hyatt Roller Bearing Company, secretary and assistant treasurer; William M. Sweet continues as manager.

The following concerns were elected to membership in the organization: Geuder, Paeschke & Frey Company, Milwaukee, Wis.; American Sheet and Tin Plate Company, Pittsburg, Pa.; Champion Machine & Forging Company, Cleveland, Ohio.

CHAMBER OF COMMERCE DEFINES COMMERCIAL CAR

The Automobile Chamber of Commerce, New York City, has defined a commercial car as follows:

"A commercial motor car is a self-propelled vehicle designed to be operated without rails for the primary purpose of transporting materials, products, passengers or apparatus especially for business purposes or for hire, profit, emergency work, or special utility service as distinguished from private personal use by the owner or renter for enjoyment or convenience."

It will be noted that this definition excludes all vehicles that are not designed by the manufacturers primarily for industrial or commercial purposes. Thus, a machine designed for a taxicab, station wagon or motor stage is a commercial vehicle although it may be used as a private passenger conveyance by the owner. Fire apparatus, usually mounted on a truck chassis, belongs in the commercial class, but fire chiefs' cars belong in the passenger car class because they are touring car or runabout chasses fitted with special bodies and used for a special purpose.

Touring cars that have been converted to commercial uses by reconstruction are not included in the definition, which takes cognizance of the original intent of the design, although such converted cars may be registered as commercial vehicles by the secretaries of state.

BRIGHT OUTLOOK FOR PERMANENT ROADS

Commissioner Carlisle, of the New York State Highway Commission, issued an announcement at Albany early in December that his plans for future work contemplate the construction of a largely increased mileage of brick and concrete roads. Charges are heavy when they have to be hauled long distances from other States, it is therefore proposed to establish a brick making plant, to be operated by State convicts.

Special Road Repair Truck

A change in the maintenance system for macadam and bituminous roads is also contemplated. This consists in substituting for the present inefficient patrol system a gang system, each of the nine divisions of the State road system maintaining a repair crew provided with a portable repair outfit. This outfit consists of a motor truck or tractor designed especially to carry all the necessary equipment for making extensive repairs to bituminous macadam, as well as to water-bound macadam roads. Although designed for a speed of 15 m.p.h., the truck can be used as a road roller.

FIRE COMMISSIONER COLE, of Boston, Mass., has purchased sixteen Buick automobiles, without advertising for bids, making a total of twenty-five Buicks in the fire department.

A STUDEBAKER ROADSTER is daily driven over a route which includes various ward schools, and the children are encouraged to make deposits at the curb. This is operated by a banking concern in Phoenix, Ariz.

HOW MARYLAND IS MEETING TRAFFIC CONDITIONS

Motor trucks interests that have been concerned over the reported proposal to enact legislation in Maryland this winter to limit the weight and speed of motor trucks for the protection of the state roads will be relieved by information contained in a letter received recently from H. G. Shirley, chief engineer of the Maryland State Roads Commission, by the Automobile Chamber of Commerce. This letter states that the Maryland State Road Commission has under construction at the present time about 60 miles of concrete road; that it has no desire to impede economical advancement of hauling larger equipment than has heretofore been used; that bridges that are being erected will carry almost any load that can be hauled over a highway, as it designs for a weight of 24 tons with a factor of safety of 3, which would carry theoretically a seventy-two-ton load, this being sufficiently strong to carry the increase of traffic for many years to come.

It is quite a difficult matter to decide just where to draw the line; it is thought that the officials of Maryland will always try to be reasonable and try to draw the line where it will be fair to all concerned.

Governor Goldsborough has appointed a traffic commission to investigate motor trucking and other traffic conditions to cooperate with the State Roads Commission in drafting a law that will be fair to all parties concerned. These commissions are now studying the weights and also the loads of large wagons, motor trucks and traction engines, width of body, tire widths and other factors related to road use. These commissions have also been asked to bear in mind that eleven eastern states have appointed special commissions to meet together and evolve a uniform vehicle law that will do away with the many annoying differences in the present laws that are an impediment to interstate travel by highway. These commissions are now at work on the task, and pending the results of their labors it will only complicate the situation if Maryland and any other states enacted special laws at variance with the provisions of similar laws in force in the principal commonwealths.

Motor vehicle manufacturers hold that it would be politic to delay action on all movements toward automobile and motor truck legislation until joint commissions make their report, which is expected during the present winter. If this is not done, however, they recommend that any new bill to regulate heavy vehicles be made to conform in provisions with the law enacted last spring in Massachusetts and the regulation promulgated during the summer by the State Highway Commissioner of New York, which is almost identical. These limit the gross weight to 14 tons and the speed to 15 m.p.h. for vehicles weighing more than 4 tons, and to 12 miles an hour for those weighing more than 6 tons. Weight per in. width of tire on any one wheel is restricted to 800 lbs.

According to the annual report of Secretary of State May, of New York, there were 13,000 commercial cars registered in that State on October 1, 1913.

Personal Items

H. B. Pruden, formerly manager of the New England Kissel Kar Branch, Boston, Mass., has been succeeded by Ralph Ketchum.

C. H. Hatfield and his son, C. B., Jr., have withdrawn from the Hatfield Company, Elmira, N. Y., and have leased a machine shop in that city.

Fred W. Thatcher, formerly with the Firestone Tire & Rubber Company's Detroit branch, has become manager of the company's Memphis station.

J. E. Baird, formerly with the Kingman Plow Company, has been appointe t advertising manager of the General Motors Truck Company, Pontiac, Mich.

Hugh H. C. Weed, vice-president of the Carter Carburetor Company, St. Louis, Mo., has become manager of the carburetor department of the H. W. Johns-Manville Company.

W. C. Decker, formerly sales manager for the International Harvester Company, Cleveland, Ohio, has resigned to look after sales of Willys trucks for Bowman & Libby Company.

Howard Wilcox, formerly president of the Standard Motor Truck Company, Detroit, has been appointed factory representative of the Federal Motor Truck Company, of Detroit.

T. V. Graves, formerly manager of the Goodyear Rubber Company in Omaha, Neb., has opened a business of his own at 2102 Farnam Street. He will handle American tires.

Long Manufacturing Company, Detroit, Mich., has increased its capital from $300,000 to $400,000.

Hahn Motor Truck & Wagon Company, Reading, Pa., recently incorporated, has opened plant on S. 4th Street.

Cass Motor Truck Company, Port Huron, Mich., has been reorganized and increased its capital. A. W. Frantz, general manager.

Admiral Motor Truck Company, St. Louis, Mo., will start manufacturing in a short time, according to Earl Porter, and orders for a large number of one-ton trucks are about to be placed.

Kelly-Springfield Motor Truck Company, organized under the laws of Ohio, capital stock $2,500,000, of which $54,064.20 is to be used, in the State of Missouri, with office in Kansas City.

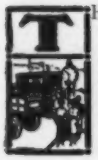
Federal Truck Company, Pierce Building, St. Louis, Mo., has moved to 1215 Chestnut Street.

Bosch Magneto Company, New York City, has reduced the list of prices of Bosch products, the reduction amounting to 17 per cent.

Sternberg Motor Truck Company of New York has moved into its recently completed service station at 12th Avenue and 132d Street, New York City. This building will accommodate between 100 and 150 trucks.

Motor Truck Club Incorporated

Becomes National Organization—Future Plans for Drivers Outlined at Annual Meeting



THE annual meeting of the Motor Truck Club at the Hotel Cumberland, Broadway and 54th Street, on Wednesday, December 17th, was well attended by enthusiastic members. Secretary Ellis L. Howland read a report of the work of the past year, pointing out the large increase in membership and the valuable work in connection with preventing adverse legislation, etc. This was followed by Treasurer Chas. E. Stone's report, and by George Duck's report as chairman of the Ways and Means Committee, and by the chairmen of other committees.

The most important event was the incorporation of the club under the name of the Motor Truck Club of America, the papers having been filed at the time of the meeting. From now on the club will be recognized as a national organization. The new constitutional by-laws were read and adopted section by section. These provided for a new type of membership, known as sustaining members, consisting of firms which pay $50, thus establishing a fund to be known as the sustaining fund. Disbursements from this can only be made with the sanction of the sustaining members. The new constitution also provides for branches in various cities wherever fifteen members so desire.

Objects of the New Organization

In the broader field in which the Motor Truck Club of America intends to work there is much to be expected from the co-operation of owners. Briefly the objects of the club are as follows:

(a)—To take over the assets and liabilities of the present Motor Truck Club, an unincorporated body, with chief offices at New York City.

(b)—To promote the use and efficiency of all forms of self-propelled and mechanically propelled commercial vehicles; to watch over and protect the interests of owners, users and others interested in motor vehicles for commercial purposes, and to do all and any things necessary to that end.

(c)—To associate together those interested in the use, manufacture and sale of self-propelled and mechanically propelled commercial vehicles and those interested in kindred industries and utilities, both for exchange of views and for social relations.

(d)—To afford legislatures, public bodies and others facilities for conferring with owners, users and others regarding matters of mutual interest.

(e)—To originate, promote, oppose or otherwise influence legislation in the interests of motor trucks, users and manufacturers, and the efficient use of such vehicles.

(f)—To assist or oppose litigation in cases where the public's and owners' interests in motor trucks are affected; so far as may be legally done.

(g)—To collect and diffuse statistics and other information on matters affecting motor trucks and their use; and to print, publish and circulate such periodicals, books, circulars and other literary matter as may conduce a wider knowledge of motor trucks and matters appertaining to their more efficient use.

(h)—To improve and elevate the general technical knowledge of motor trucks among persons interested in motor trucks; to encourage, promote or assist schools, classes and lecture courses to the same end; to test by examination or otherwise the competence of persons owning or operating motor trucks and to award certificates, indicating the results of such tests; all to the end of having motor trucks more efficiently made, sold and operated.

GEORGE H. DUCK
President of the newly incorporated Motor Truck Club

(i)—To co-operate or affiliate with other organizations having similar aims and interests to our own, or to receive such organizations into affiliation or membership with this organization.

(j)—To establish and maintain a library or museum of publications, prints, drawings, models or designs of interest in the evolution of motor trucks and motor vehicles.

(k)—To perform all necessary things appertaining to the financing of the Club through legal methods; and to hold and disburse its funds subject to its by-laws.

(l)—To do any other lawful thing necessary or conducive to the attainment of the ends of the Club.

Retiring President D. C. Fenner talked on the past and future of the organization, after which the club proceeded to the election of officers, the secretary casting an unanimous ballot for the following officers, where names were presented by the nominating committee:

Officers

George H. Duck, President, Locomobile Company of America.
E. W. Curtis, Jr., First Vice-President, General Vehicle Company.
Arthur J. Slade, Second Vice-President, Consulting Engineer.
George Stevens, Third Vice-President, Adams Express Company.
Ellis L. Howland, Secretary, *Journal of Commerce*.
Morris R. Machol, Treasurer, Hydraulic Truck Sales Company.

Board of Directors

E. C. Hoopengarner, one year, Swinehart Tire & Rubber Company.
George H. Pride, one year, Heavy Haulage Company.
T. K. Sleeper, one year, Seeman Brothers.
W. Oscar Shadbolt, one year, Shadbolt Manufacturing Company.
Frank V. Smith, two years, United Electric Light & Power Company.
H P. Caverley, two years, National Lead Company.
Emanuel Lascaris, two years, De Dion Bouton.
J. W. Perry, two years, Lippard-Stewart Company.
David C. Fenner, three years, International Motor Company.
C. R. Langenbacher, three years, Lord & Taylor.
Charles E. Stone, three years, Walter Truck Company.
Roderick Stevens, three years, Olin J. Stevens Company.

Each of the new officers was called upon in turn to speak, and votes of thanks were tendered the retiring officers and committees.

The meeting was then thrown open for discussion. Emanuel Lascaris asked to be the first to become a sustaining member.

A discussion of the best methods of electing new members was finally referred to the board of directors.

The club has among its members truck owners. An interesting viewpoint on the part of the owner was given by Mr. McIsaacs, of the Smith, Houser & Locker Construction Company of New York City, now using trucks on the New York aqueduct work. He told the club frankly that, although they were using trucks, they would not be interested in purchasing more trucks until something definite was done to provide better drivers. He stated that his experience with ex-taxicab drivers, and men who had formerly driven pleasure cars, had been anything but satisfactory. These men were not only incompetent, but reckless, and were in the habit of driving other automobiles and carriages on to the sidewalks to escape being run down. He himself had followed the trucks in his own car, and in other ways acted as a detective, which was very disagreeable to him, but necessary. He had finally decided that he would take from his own men the most likely ones and place them on trucks with the few reliable drivers in his service, paying these men $15 a week to ride with the driver and learn how to handle the steering wheel and brakes. At the end of a certain time, if satisfactory, he would put them into an evening school of his own selection, pay their tuition fee and insist upon their learning the mechanical details of the vehicle and obtaining a certificate from the school, at which time he would put them in charge of the truck at $21 a week for an eight-hour day.

This statement on the part of a user voiced the thoughts of more than one owner of trucks, and was but another proof that the proposed work of the club for the improvement of drivers is most needed. Briefly, these plans are as follows:

Motor Truck Plans for Improvement of Drivers

The club's plans in this direction are based on the successful work of the Commercial Motor Users' Association of Great Britain, which in the past ten years has solved many of the problems which American users are now facing. This association promotes annually in England what is called "The Parade," which in reality is, however, an efficiency competition covering several months, culminating in a parade. The truck club intends to promote such a competition, and hopes to start same in February to continue until mid-summer, when the parade proper and awarding of prizes and certificates will take place. It will be in charge of a committee composed largely of engineers.

CLASS ENTRIES would be received in three main classes and suitable prizes, donated or purchased, would be awarded for the most proficient in each class, the basis of judgment being determined by the several committees in charge. The entries would be broad enough to create classes for competition among (a) Drivers, (b) Superintendents, and (c) Owners. A suggested scope of the season's course in the several classes would include the following:

DRIVER'S CLASS.—1. A technical examination would be required (not too severe, but, nevertheless, practical) divided into two parts (a) oral and (b) written. To prepare for these, lecture courses should be established with competent experts, as the speakers and all motor truck drivers in the employ of members of the Club should be furnished tickets of admission to the lectures and be held to a certain record of attendance, regularly reported to their employers.

2. Inspection.—It should be the policy of the competition committee to have all trucks and drivers entered for the competition, inspected periodically, both in the garage and on the street, at which times there would be questioning of the drivers to ascertain their proficiency.

3. Record—Carefully prepared record blanks would be furnished. All competitors and drivers would be expected to fill them out regularly during the period of competitive observation. Such items as mileage, tire and fuel economy, freedom from accident, days of regular work, etc., would count in this record.

4. Appearance.—The appearance of the driver's truck, both during observation and in the final parade, would be figured in the scoring.

SUPERINTENDENTS' CLASS.—This class would include the men in charge of garages or equipment. The lecture courses would be open to them and not only would the final appearance of their fleets in the parade be counted in the competition, but such items as the following, determined on the inspection visits: (a) condition of vehicles, (b) plant condition, (c) plant efficiency, (d) truck-days in operation, (e) efficiency of public garages.

OWNERS' CLASS.—Firms and corporations belonging to the Club would be eligible to enter part or the whole of their motor truck fleets and would be judged not only on these, but also on certain conditions incidental to their efficient use of motor trucks. The following are suggested: (a) Systems—routing, loading, unloading and garaging; (b) best fleet entered in parade, due consideration being given for age, mileage and condition of vehicles; (c) percentage of total delivery equipment motorized. Points should also be allowed owners entering, for the showing made by their drivers and superintendents in the other classes—thus encouraging the employment of higher grade operators on motor trucks.

Education for Drivers

In addition to the encouragement given drivers by the competition itself, the following educational campaign will be inaugurated.

1. Educational.—Series of lectures on practical trucking subjects to be held during the year. The Club should publish from time to time, booklets of advice to drivers, compilations of road rules, etc., and suggest lines of study and reading which drivers might profitably pursue.

Drivers' Registration Bureau

2. Registration.—The Club should maintain a free registration bureau for the use of members and their drivers, aiming to indicate good positions open for competent drivers out of employment and competent drivers available.

MORA POWER WAGON COMPANY IN BANKRUPTCY

Mora Power Wagon Company, Cleveland, Ohio, has been placed in the hands of Frank H. Adams, as receiver. S. H. Mora, president of the company, states that this action was taken without his knowledge and consent, and that it was contrary to the desires of the largest creditors. Frank H. Adams, receiver, was treasurer of the company and admitted its bankruptcy by instruction of its board of directors.

LANSDEN PLANT TO BE SOLD JANUARY TWENTY-FIRST

Henry L. Davisson, trustee in bankruptcy of the Lansden Company, 394-400 Frelinghuysen Avenue, Newark, N. J., has arranged for a sale of the property of the company on January 21, 1914, at 2 o'clock in the afternoon, on the premises of the company.

An inventory has been made up of the entire assets of the company, which shows the gross amount of $257,995.88. Appraisers appointed by the court have fixed the value of these assets at $125,742.70; the liabilities are $142,909.29, of which $113,630 84 is unsecured.

Elite Manufacturing Company, Ashland, Ohio, has brought suit in the United States Circuit Court of the Northern District of Ohio against the Ashland Manufacturing Company, on charges of infringements of its Reliable Tire Saver patents, dated October 3, 1911, and November 4, 1913. The Elite Company is suing for an injunction and accounting.

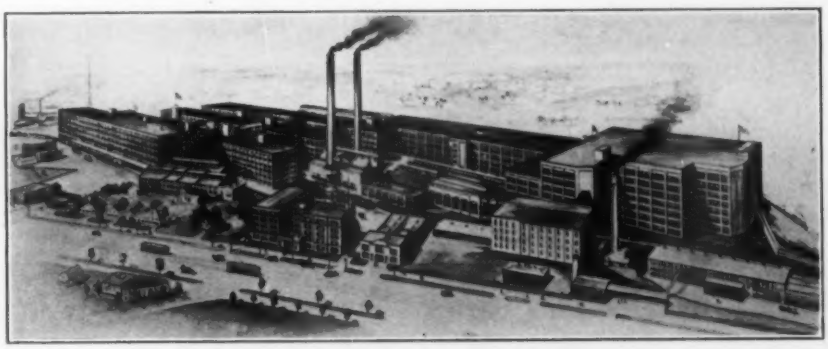
LOS ANGELES COMPANY BUYS FIFTY TRUCKS

The Motor Truck & Terminal Company, of Los Angeles, which will be perhaps the largest general trucking company in the United States, has bought in one block fifty Peerless four, five and six-ton trucks for immediate delivery. The Motor Truck & Terminal Company is one of the properties of the Perry estate, which owns the Los Angeles Market Company. The market company has the contract for provisioning all the boats which enter San Pedro harbor, 22 miles away, and the trucks will be used to carry provisions to the ships over 22 miles of finely paved road. All the trucks ordered by the company are ordered with a draw bar attachment for trailers. It is the plan to operate truck trains of two or three trailers over the long interurban hauls. A service of this kind will probably be established between Los Angeles and San Diego in the near future.

Maccar Company, manufacturer of motor trucks, will open shortly in Scranton, Pa. The trucks will be built in the old Cliff Works, the company moving there from Allentown.

Rowe Motor Manufacturing Company, Coatesville, Pa., has purchased factory site, with buildings, at Downingtown, Pa. All business is being conducted from the new address.

La Crosse Motor Truck Company, 106-108 N. Front Street, La Crosse, Wis., recently organized, has opened traffic department.



Goodyear Tire and Rubber Company Plant

Located at Akron, Ohio, the complete plant covering fifty acres and has 1,550,605 sq. ft. of floor space, employing 6,500 people. The power plant has a turbo generator capacity of 8,500 h.p., steam boiler capacity of 12,000 h.p., and an engine capacity of 7,250 h.p. It is possible to manufacture ten thousand automobile tires a day in addition to other tires that are regularly turned out. This company also produces belting, hose, packing, etc.

Cutting Down Hauling Costs

How Families in Large Cities Will Save $35 to $50 a Year When Motor Trucking and Delivery Become Universal—No Reduction in Rail and Water Rates

IT HAS been shown by various investigations that the cost of distribution adds a large percentage to the retail prices of all products of the farm and factory, and that transportation is an important item in the cost of distribution. Anything that will reduce the cost of moving crops to market and delivering them and manufactured articles of all kinds to the consumer will tend to keep down the retail price and reduce the cost of living.

During the seventy years that steam railroads have been operated in America the cost of haulage by rail has been cut from 7 1/3 cents per ton-mile to the present figure of 7½ mills, or to a little more than one-tenth the original cost. But there has been very little fluctuation of the average receipts per ton-mile for rail freight since 1900, as shown by the reports of the Interstate Commerce Commission, and the price to-day is slightly higher than thirteen years ago. So no relief is to be looked for in that direction.

Transportation by water is considerably cheaper than by rail, varying, according to such statistics as are available, from ½ mill per ton-mile on the Great Lakes and the ocean to 3 mills on canals from 5 to 10 ft. deep.

These means of transportation are essentially long haul and bulk methods. They have been developed to a degree that precludes hope of material further reductions. There remains the cost of moving freight from the producers to the shipping point and from the railroad freight yard and steamship pier to the factory or warehouse, thence to the wholesaler and retailer, and finally to the ultimate consumer. It is these repeated movements, each over a relatively short distance, that multiply the transportation costs.

In 1906 the Department of Agriculture made a careful investigation into the cost of hauling farm products to shipping points throughout the United States. The inquiry related to twenty-three principal products of farms, plantations and ranches, and nearly 1900 replies were received from correspondents. There were tabulated and analyzed. The result showed that it cost an average of a little more than 23 cents a ton for every mile that these products were hauled by horse and wagon. The average length of haul was just short of 10 miles and principally over earth roads, as at that time only a little more than 8 per cent. of all the roads in the country had been improved by hard surfacing.

The only known way of reducing the cost of haulage by team is to improve the roads. Rapid progress has been made in this matter in many States within the last decade, and particularly inside of the last five years, but whatever gains have been made in this way probably have been offset by the increased cost of using horses, because of the higher purchase prices of horses and the increased cost of hay and grain, labor and other items. Consequently, no relief has come from this quarter.

Apparently the only remaining hope for actual and substantial reduction of transportation cost lies in the commercial motor vehicle. No official and general investigation has ever been made into the cost of hauling and delivering by motor truck and delivery wagon, but large users of these vehicles have demonstrated to their satisfaction that they are much more economical than horses. Among the manufacturers of these machines it has been asserted generally that they effect a saving of from one-third to one-half. These claims are fairly substantiated by a tabulation that has just been made by the secretary of the commercial vehicle committee of the Automobile Chamber of Commerce.

Detailed reports of the operation of motor trucks and delivery wagons in the service of thirty prominent companies engaged in various lines of business, in fifteen different cities, were searched for

COST OF HAULAGE AND DELIVERY BY MOTOR AND HORSE-DRAWN WAGONS

Compiled from Records of Twenty-eight Prominent Users of Motor Trucks and Wagons

Operating Company	Location	Business	No. and Kind of Vehicle		Basis of Data	Per Day Motor	Per Day Horse	Per Mile Motor	Per Mile Horse	Per Ton Mile Motor	Per Ton Mile Horse	Per Package Motor	Per Package Horse
Abraham & Straus,	Brooklyn, N. Y.,	Dept. Store,	24		1 year record	.....	.....	11.68c	.....	.....	.....	3.67c	.....
A. Starr Best,	Chicago, Ill.,	Clothing,	1	Gas		$7.25	.....	.....	.....	.....	.....	10.33c	.....
Boston Store, The	Chicago, Ill.,	Dept. Store,	1	Elec.		.....	.....	.....	.....	.....	.....	5.6c	.....
Bridgeport Hydraulic Co.,	Bridgeport, Conn.,	Contractors,	2	Gas	9½ mos. record	.....	.....	25.3c	.....	9.85c	16.07c	.....	.....
Fair, The	Chicago, Ill.,	Dept. Store,	52		1½-ton truck, 1 year record	$9.77	.....	.....	.....	.....	.....	.....	.....
General Omnibus Co.,	London, Eng.,	Passengers,	2500	Gas	1st 3 mos. 1913	$13.22	.....	12.84c	.....	.....	.....	*2.13c	per pass
Gimbel Bros.,	N. Y. City,	Dept. Store,	14	Elec.	6 mos. record	.....	.....	10.8c	.....	.....	.....	.....	.....
Gimbel Bros.,	N. Y. City,	Dept. Store,	18	Elec.	6 mos. record	.....	.....	7.52c	.....	.....	.....	.....	.....
Gimbel Bros.,	N. Y. City,	Dept. Store,	1	Gas	6 mos. record	.....	.....	9.48c	.....	.....	.....	.....	.....
Gimbel Bros.,	N. Y. City,	Dept. Store,	1	Gas	1 year record	.....	.....	23.12c	.....	.....	.....	.....	.....
Gimbel Bros.,	N. Y. City,	Dept. Store,	1	Gas	1 year record	.....	.....	24.51c	.....	.....	.....	.....	.....
Golden Rule Store,	St. Paul, Minn.,	Dept. Store,	3	Gas		.....	.....	.....	.....	.....	.....	3.0c	6.0c
Henry Hanlein & Son,	N. Y. City,	Cut Stone,	2	Gas	Garage and taxes omitted	$14.29	.....	.....	.....	15.3c	.....	.....	.....
Igo Express Co.,	St Paul, Minn.,	Express,	5	Gas	Ry. Frt. Rate 16c ton-mile	$12.00	.....	.....	.....	6.0c	10.0c	.....	.....
Indiana Market,	Chicago, Ill.,	Meats,	1	Gas		$7.17	$13.26	.....	.....	.....	.....	.....	.....
Michaud Bros.,	St. Paul, Minn.,	Groceries,	6	Gas		.....	.....	.....	.....	.....	.....	2.5c	4.5c
McMillan Co., J. T.,	St. Paul, Minn.,	Pork Packers,	1	Gas		$8.32	$13.27	.....	.....	.....	.....	.....	.....
Nawn Co., Hugh,	Boston, Mass.,	Contractors,	6	Gas	5 mos. record	$17.20	.....	37.6c	.....	.....	.....	.....	.....
Perkins Co., H. J.,	Springfield, Mass.,	Produce,	3	Gas	1 year record	$11.95	$16.80	.....	.....	.....	.....	.....	.....
Rothschild Co., Maurice,	Chicago, Ill.,	Dept. Store,	6	Gas		$16.20	$33.00	.....	.....	.....	.....	8.0c	11.0c
Spaulding & Spaulding,	Buffalo, N. Y.,	Coal,	17	Gas	8 mos. record, 1 truck	$9.40	.....	27.5c	.....	11.3c	.....	.....	.....
Springfield Breweries,	Springfield, Mass.,		1	Gas	Record for 11½ mos.	.....	.....	.....	.....	.....	.....	8.5c	20.0c
Standard Oil Co.,	Nashville, Tenn.,	Oil,	1	Gas	2 yr. experience	.....	.....	.....	.....	32.6c	.....	.....	.....
Standard Oil Co.,	Memphis, Tenn.,	Oil,	1	Gas	2 yr. experience	.....	.....	.....	.....	7.62c	.....	.....	.....
Standard Oil Co.,	Memphis, Tenn.,	Oil,	1	Gas	2 yr. experience	.....	.....	.....	.....	7.94c	.....	.....	.....
Stix, Baer & Fuller,	St. Louis, Mo.,	Furniture,	10			.....	.....	.....	.....	.....	.....	24.33c	35.0c
Stix, Baer & Fuller,	St. Louis, Mo.,	Bulky Goods,	10			.....	.....	.....	.....	.....	.....	10.5c	14.75c
Transit House Stores,	Chicago, Ill.,	Meats,	2	Gas		$4.19	$7.42	.....	.....	.....	.....	.....	.....
Troy Wagon Works,	Troy, O.,		1	Gas	16 tests	.....	.....	.....	.....	14.0c	27.7c	.....	.....
United Dressed Beef Co.,	N. Y. City,	Meats,	29	Elec.	7 yr. experience	.....	.....	.....	.....	7.89c	17.28c	.....	.....
United Dressed Beef Co.,	N. Y. City,	Meats,	..	Gas	7 yr. experience	.....	.....	.....	.....	8.04c	.....	.....	.....
Wouter's Laundry,	Chicago, Ill.,	Laundry,	5	Gas		.....	.....	11.0c	.....	.....	.....	2.66c	.....
Mill Corporation,		Hauling Coal,	..	Elec.		$12.00	.....	41.6c	.....	8.3c	.....	.....	.....
Retail Dealer,	Eastern City,	Coal,	3	Elec.	1 mos. record	$10.34	.....	.....	.....	7.5c	.....	.....	.....
Retail Dealer,	Suburb,	Coal,	..	Elec.		$12.64	.....	.....	.....	13.3c	.....	.....	.....
Wholesale Dealer,	Large City,	Coal,	..	Elec.		.....	.....	.....	.....	6.7c	.....	.....	.....
					Average	$11.06	$16.75	20.24c	.....	11.23c	17.76c	7.90c	15.04c

*Omitted from average.

reliable records of operating costs. In many cases these cost records were itemized and covered periods of a year or more, sometimes embracing the figures for fleets of from five to fifteen or more vehicles. These data were analyzed and tabulated (see accompanying table), so as to show the cost of haulage and delivery per day, per mile, per ton-mile and per package.

Wherever possible, the cost of performing the same service with horses and wagons was set opposite the figures for motor haulage for comparison. These horse costs were given in each case by the companies owning the motor vehicles from their own experience with horses engaged in the same service, so the comparison is in the highest degree fair and reliable.

The result of this study indicates that the average cost of hauling in the city by motor is 11¼ cents per ton-mile, as compared with 17¾ cents by horse. This represents a saving of 36 per cent. The average cost of deliveries by department stores, furniture, clothing and grocery stores, meat markets and electric light companies is shown to be approximately 8 cents by motor and 16 cents by horse, representing a saving of more than 50 per cent. by the former method. The analysis shows that the average cost of operating motor trucks and delivery wagons, embracing all sizes of both gasoline and electric machines, is $10.97 a day. This covers all items of operation and maintenance, such as driver, garage, interest and depreciation. The average cost of doing equivalent work with horses is $16.75 a day, which represents the expense of from two to three wagons, with drivers. Here is a saving of more than 34 per cent.

What the general use of these vehicles will mean to a community is indicated by some figures submitted by the head of a Chicago cartage company to the Chicago Association of Commerce. This report states that more than 250,000 tons of freight are hauled through the streets of Chicago daily by team and motor truck, and that this represents an annual business of more than $60,000,000, or about $25 a year for every inhabitant. There are more than 50,000 horse-drawn wagons and trucks in use in Chicago and about 4000 motor trucks and wagons. When the 50,000 are converted into 20,000 motor vehicles, the direct saving in haulage will amount to from $20,000,000 to $30,000,000, or $8.25 to $12 a year for each inhabitant, or about $35 to $50 a year for each family.

Large as this saving is, it really will be much greater, because the reduction of traffic congestion in the streets and at freight depots, resulting from the elimination of more than half of the vehicles will so expedite haulage that it can be done still cheaper by motor wagons than under present conditions.

Another way in which the cost of living is going to be cut down by the revolution in road transportation methods relates to farm lands. The last government census showed that there were 24,000,000 horses and mules in the United States. Land equal to the combined area of Ohio, Indiana, Illinois and Iowa was required to raise the hay, grain and grass to feed these animals, it is estimated, yet the horses and mules do not produce any human food. In other words, 25 per cent. of the total value of all agricultural products goes to feed animals to furnish transportation and power. Motor vehicles and traction engines, which consume gasoline, kerosene, coal and other fuels derived from inedible materials or from alcohol distilled from waste vegetable matter, can do most of this work and release this tremendous acreage of productive land for the raising of human food. The effect that this should have on the cost of foodstuffs is obvious, although it has not been estimated.

If facts such as these could be impressed sufficiently upon our civic authorities, legislators, farmers, highway commissioners and industrial and commercial associations, the motor vehicle would be recognized as one of the greatest boons of the twentieth century, rather than as a public nuisance to be legislated against and looked upon as a doubtful economic institution.

Rate of Motor Truck Increase

(From Automobile Chamber of Commerce, New York City.)

Official and authentic figures from Chicago throw an illuminating light on the increase of motor trucks and delivery wagons as compared with the increase of passenger cars and the decrease of horse-drawn vehicles.

A statement compiled by City Collector Cohen, of Chicago, shows the number of all kinds of road vehicles registered under the local vehicle tax from May 1, 1910, to December 24, 1913, and the revenue obtained each year from them. The figures are given in the accompanying table.

An analysis of the figures shows that the number of horse-drawn vehicles has decreased each year, so that there are now more than 4000 fewer than three and a half years ago, notwithstanding the rapid increase of population and business of the western metropolis. In the meantime, passenger automobiles have increased from 9963 to 21,373, or more than 114 per cent.

But in the same period commercial motor vehicles have increased from 799 to 3964 or very nearly 400 per cent. Relative increases and decreases of the various types of vehicles are as follows:

	(1912 over 1911)	(1913 over 1912)	7¾ mos. 1913 over prev. 12 months
Horse-drawn Vehicles	(Dec.) 2,329 = 4%	(Dec.) 285 = ½%	(Dec.) 1,465 = 2.6%
Passenger Cars	(Inc.) 1,913 = 19%	(Inc.) 4,981 = 42%	(Inc.) 4,475 = 26%
Commercial Cars	(Inc.) 779 = 97%	(Inc.) 1,257 = 79%	(Inc.) 1,129 = 39%

	5-1-10 to 4-30-11	5-1-11 to 4-30-12	5-1-12 to 4-30-12	5-1-13 to 12-24-13	Rate per Annum
1-Horse Vehicle	40,109	38,694	38,429	38,019	$5.00
2-Horse Vehicle	17,640	16,771	16,728	15,745	10.00
3-Horse Vehicle	331	290	325	256	15.00
4-Horse Vehicle	34	30	20	17	25.00
Total Wagons	58,114	55,785	55,502	54,037	
Motor Cycle	1,838	2,778	4,112	4,819	3.00
Autos (Seating 1 or 2)	3,331	3,761	.....	.....	12.00
Autos (35 h. p. or less)*	.....	.....	14,593	18,757	10.00
Autos (Seating 3 or more)	6,632	8,115	.....	.....	20.00
Autos (More than 35 h.p.)*	.....	.....	2,264	2,575	20.00
Total Passenger Cars	9,963	11,876	16,857	21,332	.....
Auto Delivery Wagon (Capacity 1 ton or less)	436	922	1,680	2,297	15.00
Auto Truck (Cap. over 1 ton)	363	656	1,155	1,667	30.00
Total Commercial Cars	799	1,578	2,835	3,964	
Dealers' Demonstrators	326	490	593	614	1.00
Total All Motor Vehicles	11,088	13,944	20,285	25,910	

*Beginning May 1, 1912, passenger automobiles were classified according to horsepower instead of seating capacity, as heretofore.

The growth of the automobile industry has been pronounced phenomenal by the Director of the United States Census and has been one of the marvels of the age. Everybody in it has been satisfied with the progress made. More amazing development of the motor truck business evidently is expected, however, because, while sales of commercial cars have increased at rates of 97 and 79 per cent. a year in Chicago, and no doubt at nearly the same rate in other large cities from Boston to San Francisco, there has been much discussion of the question "What is the matter with the truck business"?

As a matter of official record, the commercial car business has increased at a much more rapid rate than the passenger car business ever did, although it has attained to only one-tenth the volume of the latter at the present time.

It is to be expected that when general confidence in the future is restored in the business world, there will be a large increase in commercial car buying. Ordinary caution keeps the business man from converting his horse equipment into motor delivery wagons and trucks during a time of financial stress. He believes in the adage "Never change horses when crossing a stream." When this crossing has been made in safety, there will be a rush to change horses for trucks and not be caught in the same position again.

Referring to the rate of annual vehicle tax in Chicago, as shown in the table, it is found that the average rate charged against horse-drawn vehicles is $13.75 and that the great majority pay only $5 a year, while the average rate for motor vehicles is $17.83 and the greater number pay $10 a year. The heaviest burden falls on motor trucks of more than one-ton capacity.

Receipts from May to December, inclusive, 1913, are just about evenly divided between horse-drawn vehicles and motor vehicles including motor cycles. The total amount of taxes is $670,289.33.

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PROPOSED PLAN TO ENFORCE MORE CAREFUL DRIVING ON THE PART OF COMMERCIAL CAR OPERATORS

THE importance of the driver to the commercial car industry is at last receiving the attention which it manifestly deserves. Users who have had experience realize full well that "a truck is no better than its driver." A poor, careless, or indifferent driver can put the best truck ever made out of commission in a very few weeks, or even days. Fully 90 per cent. of truck troubles to-day are due to the drivers alone. The situation demands immediate and drastic action. Something must be done at once.

The thoughts of more than one large user were undoubtedly voiced in the remarks of a well-known fleet user in New York City, when he said, that although he was a large truck user, he was not interested in buying any more trucks until something could be done to improve the driver situation.

Incompetence is only part of the trouble. Much of truck abuse is due to carelessness and indifference, and sometimes even to wilful intent.

The COMMERCIAL CAR JOURNAL has been hammering away at the trade, which means the manufacturer and the agent, and also at the users, trying to bring forcibly to their attention the great importance of the driver in connection with truck operation. Gradually we have succeeded in stirring up a little gray matter action on the subject. We now propose a scheme which we feel will have a far-reaching and decidedly beneficial effect upon truck drivers in general throughout the United States. The outline of this proposed method is as follows.

Scheme for Reporting Truck Abuses

It is well understood that drivers cannot be watched efficiently by the owner. A few realizing the importance of the matter are using recording devices as well as governors and other methods of controlling the drivers' actions, but in spite of these the great majority of truck drivers are entirely free to do just as they please with the owner's expensive equipment. Some method of reporting flagrant abuses should be inaugurated which would extend over the length and breadth of the entire country. This at first appears to be a stupendous task, but we believe the following system if properly set in motion and supervised will dampen the ardor of many reckless drivers.

That the scheme is not an imaginary and impractical one is shown by the fact that a very similar method is used to enforce the game laws of the United States. The game wardens are very largely traveling salesmen, men who are continually on the move in their particular states, and are thus in a position to note law transgression and violations in general of the game laws. Hunters in all parts of the country realize that they are liable at any time to be seen and reported, if hunting out of season or carrying game shot out of season.

The parts salesman is the man to remedy this widespread truck evil. He is continuously on the road, he is in every nook and corner of the United States, in both large and small cities. He is interested in the success of motor-driven commercial cars, especially if the parts which he respresents are used in these vehicles. Why not organize these traveling parts salesmen for the express purpose of reporting to the proper authorities, every instance of incompetent handling or rank truck abuse. The manufacturer and the owner are both greatly interested in hearing of cases where their trucks are being shamefully treated. They cannot follow the machine on the road, but the parts salesman, if it was to his special interest in a pecuniary way, would keep his eyes open, and it would be but a short time before drivers in all parts of the country would realize that they could not, with impunity, maltreat and abuse the expensive equipment entrusted to them.

A Protective Association Proposed

We propose the formation of an association composed of manufacturers, agents and owners, who will jointly provide the funds necessary to pay the parts salesman for each and every instance of truck abuse which he reports. A small pad on which could be noted the date, make of truck, name of firm, and character of abuse, would facilitate reports. This could be mailed to a committee, who would notify both the owner and the local agency of what was going on, the case verified, the driver cautioned, reprimanded, or fired as found expedient.

A small sum could be paid to these traveling salesmen for each and every instance sent in, which would make it well worth their while to fill out and mail the report slip supplied them.

Men so discharged could be black-listed on the committee's books. These records would soon become very valuable and the committee could act as a clearing house through which owners could get in touch with competent and satisfactory operators.

The mere fact that such an organization existed, which virtually amounts to having a large number of trained detectives, would very soon make itself felt and be reflected in the changed attitude of the careless truck driver. Drivers who were conscientiously attending to business, and handling their trucks to the best of their ability unless very incompetent, would have nothing to fear, but woe to the reckless or wilful operator. We believe that the wholesome effect on drivers in general throughout the country would be extremely marked, within a very short period after the system became effective.

As the Motor Truck Club of America, with headquarters in New York, is now a national organization, composed of exactly the persons interested in such a movement, we suggest to that organization the possibility of such a plan as this be discussed, and if possible be made an important part of the work of that organization throughout the United States. As branches of the Motor Truck Club are being started in all the large cities, the establishment of this system would be comparatively easy, the mere fact of the Truck Club's operating such a system would be conducive to the formation of branch clubs in other parts of the country and would be especially productive of owner membership, which is very necessary to the success of such a movement. We therefore urge the earnest attention of the officials of the Motor Truck Club to this proposed scheme.

We also shall be pleased to hear from our readers, whether manufacturers, agents or owners, as to their ideas and suggestions for such a proposed method of controlling the drivers throughout the country.

REPUBLIC RUBBER CLUBHOUSE

The employees of the Republic Rubber Company, Youngstown, Ohio, have a club organization which is unique in the automobile field in that it has a membership strong enough to erect a large, handsome club house at Youngstown, Ohio, which would be a credit to any large city. The new club house was opened to the members on January 15th, 1914. The governors of the club are Chas. A. Miller, Daniel Evans, Oscar Watkins, N. W. Sayles, C. C. Porter, A. H. Harris, Jacob Dieter, J. H. Kelly and Thos. L. Robinson.

GRAMM-BERNSTEIN COMPANY, Lima, O., is enlarging its selling force, and is looking for three or four high-grade experienced motor truck salesmen to add to its staff.

Steel and Rubber Markets

Steel in Stronger Position

The steel situation has taken on a firmer tone during the first two weeks of the new year, and there has been somewhat of an advance in prices. The steel mills are now working about 50 per cent. of capacity, and a stronger tone and some advance in prices of steel products in Europe also have acted as a tonic upon both prices and trade in domestic channels. Quotations on January 12th were:

STEEL PRODUCTS PRICES

Bessemer steel, per ton, mill	20 00	a	.....
Open hearth, per ton, mill	20 00	a	.....
Sheet bars, per ton	20 50	a	21 00
Steel bars, soft base, half ex tidewater	1 31½	a	1 36½

The above prices are at tidewater in carloads and larger lots. For quantities less than 2000 lbs., but not under 1000 lbs., $2 per ton additional is charged, and less than 1000 lbs, $8 per ton additional.

SHEETS

The following prices are for 100-bundle lots and over f. o. b. mill; smaller lots $2 per ton higher.

Gauge—	Black.	Galvanized.	Gauge—	Black.	Galvanized.
Nos. 22 & 24	1 65	1 95	No. 28	1 85	2 85
Nos. 25 & 26	1 70	2 65	No. 29	1 90	2 95
No. 27	1 75	2 75	No. 30	1 95	3 15

IRON AND STEEL AT PITTSBURGH

Bessemer iron	15 15	a	15 25
Bessemer steel, f. o. b. Pittsburgh	20 00	a	.....
Muck bars	29 00	a	30 00
Skelp, grooved steel	1 20	a	1 25
Skelp, grooved iron	1 55	a	1 60
Ferro-manganese (80 per cent.), seab ard	45 00	a	.....
Steel, melting scrap	10 25	a	10 75
Steel bars	1 20	a	1 25
Black sheets, 28-gauge	1 80	a	1 90
Galvanized sheets, 28-gauge	2 80	a	2 90
Blue annealed, 10-gauge	1 40	a	1 45
Tank plates, ¾-in. and heavier	1 20	a	1 25

Crude Rubber Quiet

Trading in crude rubber lacked snap during the past month, conditions on both sides being quiet. Manufacturers are receiving a limited demand for their product in many instances and are not inclined to provide for their future requirements of crude rubber. Quotations on January 12th were:

Up-River—			
Fine	75	a	..
Coarse	46	a	47
Island—			
Fine	60	a	61
Coarse	29	a	30
Cameta	35	a	36
Caucho—			
Ball	45	a	..
Centrals—			
Corinto	40	a	..
Esmeralda	39	a	..
Guatemala, slab	42	a	..
Mexican—			
Scrap	42	a	43
Strips and scrap	45	a	46
Guayule	Nominal		
Tires—			
Automobiles	5	a	..
Bicycle, pneumatic	3	a	3½
Wagon and carriage, solid	5	a	..
Inner tubes	16	a	17

Balata, sh't	45	a	..
Ciudad, b'k	48	a	..
Trinidad, b'k	Nominal		
Africans—			
Massai, red	47	a	..
Red C'go	Nominal		
B'k C'go	47	a	..
Soudan—			
Niggers	Nominal		
Gambia, prime	44	a	..
East India—			
Smk, sh'ts	59	a	60
Ceylon bis and sh'ts	55	a	..
Pale crepe	56	a	..
Pontianac—			
Prime plantation	6	a	..
Palembang	6	a	7

DOMESTIC SCRAP

SPLITDORF ELECTRICAL COMPANY, Newark, N. J., have taken over the Apple Electric Company, of Dayton, Ohio, and will hereafter manufacture the Apple Electric starting and lighting system and other Apple Electric apparatus. It is understood that the Apple factory in Dayton is to be continued also.

INFORMATION BUREAU AND CORRESPONDENCE

"GASOLINE CONSUMPTION TOO HIGH"

"In operating my five-ton truck I find the gasoline consumption too high as it averages about 2½ miles to the gallon, where as the salesman before I purchased the truck told me I would average 5 and 6 miles to the gallon. A friend of mine owning the same make and size truck has an average of 4 miles to the gallon. I have called upon the service department of the manufacturers without securing any great difference in results."

Kansas City. A COAL MERCHANT.

There are several reasons to advance for your difference in gasoline consumption.

First, there may be either a difference in the governor adjustment on the motor or that of the gear ratio. Your city is hilly and you may be using low gear more than necessary. The supposed governed speed of the size and make truck you mention is 6 m.p.h. No two drivers will secure the same results in so far as gasoline consumption is concerned and probably this is the largest factor entering into your difference.

Carburetor adjustment will have a slight difference in your trouble, but your first impression is wrong owing to a misleading statement on the part of the salesman.

Your make of five-ton truck has never averaged as much as 5 or 6 miles per gallon but with a competent driver you should secure at least 4 miles per gallon. The difference between city and country running will effect the consumption.—EDITOR.

SOMEWHAT MIXED

"I have been considering the purchase of a fleet of trucks but have heard so much from salesmen as to completely upset any ideas or opinions which I may have had. First, the idea of speed is instilled in my mind and then the ability to climb grades on high gear. Recently I am led to believe that these points are not determining factors. Can you not give me advice which will lead me to some conclusion in this matter?"

New York City. INTERESTED.

Speed is one of the things to be guarded against. Always see that the demonstration is given under regular conditions. All except imported trucks operate at governed speeds which have been found proper in the long run, unless as is often the case, the governor is disconnected to make a showing not afterward possible in the truck purchased.

One of the poorest practices is trying to make a truck take a hill on high gear. The different gears are placed in the gear case to be used on such occasions. One truck may be fitted with an excessively large motor which will enable the truck to take a grade on high gear, but in making such an effort more gasoline and oil, wear and tear take place than will compensate for the small saving of tire in climbing a certain grade. Investigate well the standing and responsibility of the company selling the truck.

The history of the truck will bear investigation as well as the length of time in the trade and knowledge on the part of the salesman representing the machine in question.—EDITOR.

TRUCK QUESTIONS OF INTEREST

"En-Bloc Motor Design"

Is there any disadvantage in having a 5¼ x 6¾ T-head motor cast en-bloc outside of the propositions of assembling and "break one break all?"

"Direct Drive on Third or High"

Is there not an advantage in having a four-speed transmission with direct drive on third on heavy duty trucks?

"Gear Ratios"

What do you consider as proper gear ratios on a five-ton truck with four speeds as mentioned above?

"Are Differential Locks Necessary?"

What is your opinion as to the differential lock?

"Are Chain Drives of the Past?"

Don't you think that chain drive is a thing of the past on good trucks as it already is with pleasure cars?

"How to Estimate Cooling Surface"

Is there any mathematical way to determine what amount of cooling surface there should be to a radiator in proportion to the amount heating surface the water is subject to in the motor?

"Standard Brakes Sufficient"

Don't you believe that heavy trucks should be equipped with air or mechanical brakes?

Pittsfield, Mass. M. P. G.

Engine design and manufacturing practice have reached a point where there are no longer logical reasons for objecting to the en-bloc type of cylinder casting. Should breaks occur, as they do only in comparatively rare occasions, the various welding processes effect a most satisfactory and cheap repair.

In view of the careless and shocking manner in which trucks are handled and operated, we believe the best results are obtained from a four-speed gear set having direct drive on high rather than on third. The latter type are conducive to too great speed and engine strain.

Gear ratios vary and depend upon many factors, so that we feel that to answer your question by giving speed ratios will probably best answer your purpose. On a five-ton truck fitted with a four-speed gear set having direct drive on third the speeds will be about as follows.

1st	speed	3	m.p.h.
2nd	"	6	"
3rd	"	10	"
4th	"	13	"

With a gear set having direct drive on high the speed will run about as follows:

1st	speed	2	m.p.h.
2nd	"	5	"
3rd	"	7½	"
4th	"	10	"

Regarding the value of the differential lock, we are informed by a former engineer of the Sampson truck, which used this device for a number of years, that it was employed so rarely as to not justify its incorporation in the design and in fact was so often improperly employed as to cause serious tire trouble and in many cases was the direct cause of accidents.

The final side chain drive is so entirely satisfactory and efficient as to warrant the belief of its continued use for years to come. The desire for extreme silence was one of the main causes for the general employment of the shaft type of drive in passenger car design.

While it is not such a difficult matter to estimate the required cooling area in a radiator, there are so many factors which should be taken into consideration, such as vehicle speed, engine speed, load, location of radiator, circulation system, oiling system, etc., we believe you had best submit your complete data to some of the radiator manufacturers to insure the most satisfactory results.

We believe that the present general design of truck brakes is preferable to any system which will add to complications of truck design and construction. Brake inefficiency results alone from carelessness in making proper adjustments from time to time or total indifference as to their condition. It might be well possibly, if some thought was expended toward extending present brake to bear upon front wheels as well.

There is little complaint from the use of thermo-syphon systems of water circulation, and it is being used in some of the largest sized trucks to-day. The question of whether to use it or a pump system is one largely of personal like or dislike,—each system has its advantages and disadvantages, but both are successful.

While the method of lubricating engine bearings through the medium of a hollow or drilled crank shaft has much merit the system has not been adopted to any great extent by those in the motor truck business. The simple splash system probably offers less likelihood of trouble in the hands of the careless and indifferent men who so largely have charge of vehicles and for that reason has probably been given the preference. Bear in mind that trucks are not designed and built to be handled by experts, but to prove as durable and economic as possible in the hands of those who probably never ran a machine up to the time of its purchase.—EDITOR.

Federal Motor Truck Company, Detroit, Mich., will hold its annual sales convention on January 19th. In addition to meetings at the plant, a banquet will be held in accordance with the usual custom.

AUTOMOBILE SHOWS AT WHICH COMMERCIAL CARS WILL BE EXHIBITED

January 17-24—Detroit, Mich. Detroit Auto Dealers' Association. Joseph A. Schulte, president, 1403 Woodward Avenue.

January 17-24—Pittsburgh, Pa. Motor Square Garden. Automobile Dealers' Association of Pittsburgh. W. H. La Fontain, manager, 5959 Center Avenue.

January 19-24—Washington, D. C. Washington Automobile Dealers' Association. T. Oliver Probey, president.

January 20-24—Baltimore, Md. Baltimore Auto Dealers' Association and Auto Club of Baltimore. 5th Regiment Armory Building. H. M. Luzius, Secretary, 12 W. Mt. Royal Avenue.

January 24-31—Rochester, N. Y. Exposition Park. Rochester Automobile Dealers' Association. C. A. Simmons, manager.

January 24-Februray 7—Montreal, Canada. Drill Hall. Montreal Motor Trade Association. W. P. Kearney, president, 782 St. Catharine, West.

January 26-31—Scranton, Pa. Armory. H. B. Andrews.

January 31-February 7—Minneapolis, Minn. Minneapolis Auto Trade Association. F. E. Murphy, Secretary. National Guard Armory.

February—San Antonia, Tex. Lloyd Spencer, manager.

February 2-7—Troy, N. Y. State Armory. Troy Auto Dealers' Association. Frank M. Bancus, manager.

February 7—Omaha, Neb. C. G. Powell, Secretary, 2119 Farnam Street.

February 7-14—Grand Rapids, Mich. Klingman Furniture Building. *Grand Rapids Herald*, A. H. Vandenberg, Editor.

February 8-14—Portland, Me. City Hall. Portland Auto Dealers' Association.

February 9-14—Seattle, Wash. Automobile Show. Armory. William I. Fitzgerald, manager.

February 9-14—Buffalo, N. Y. Buffalo Auto Dealers' Association. J. J. Gilson, 401 Franklin Street, Secretary.

February 11-14—Geneva, N. Y. State Armory. Geneva Automobile Dealers' Association. C. B. Dorsey, president.

February 14-21—Pittsburgh, Pa. Pittsburgh Auto Show Association, Incorporated. J. H. Zimmerman, manager, 130 N. Highland Avenue.

February 16-21—Toronto, Canada. Armory. Toronto Auto Trade Association.

February 16-22—Kansas City, Mo. New Convention Hall. Kansas City Motor Car Dealers' Association. E. E. Peake, Secretary, 909 Gloyd Building.

February 18-21—Bloomington, Ill. McLean County Auto Club.

February 21-28—Newark, N. J. New Jersey Automobile Exhibition Company. H. A. Bonnell, manager, 1022 Kinney Building.

February 22-28—Elmira, N. Y. Elmira Automobile Club. M. D. Marks, manager, 210 E. Water Street.

February 22-March 1—Hartford, Conn. Hartford Auto Club. F. Dart, chairman, Park Casino.

February 23-28—Bangor, Me. Auditorium. A. P. Pierce, manager.

February 24-28—Syracuse, N. Y. Armory. Syracuse Auto Dealers' Association. Harry T. Gardner, manager.

March—Wichita, Kans. Wichita Business Association.

March 2-4—Cincinnati, Ohio—Music Hall. Cincinnati Auto Dealers' Association. E. A. Kruse, Secretary, 808 Sycamore Street.

March 2-7—Fort Dodge, Ia. Fort Dodge Auto Dealers' Association. Auditorium.

March 3-14—Tiffin, Ohio. Auditorium. E. T. Rodgers.

March 7-14—Harrisburg, Pa. Chestnut Street Auditorium. Harrisburg Auto Dealers' Association.

March 7-14—Hamilton, Ont., Canada. New Armories. R. M. Jaffray, manager, 102 Clyde Block.

March 17-21—Boston, Mass. Boston Commercial Motor Vehicle Association. C. I. Campbell, Secretary.

April 9-15—Manchester, N. H. Mechanics' Hall. D. F. Sullivan.

May 4-9—Deadwood, S. D. Auditorium. George D. Kilkes.

New Agencies and Branch News

Gramm-Bernstein Motor Co., Lima, Ohio, has opened branch in Everett, Wash.

Green's Purchasing Agency, New York, City, has taken the agency for the Packer truck.

Prindle & Weller, 225 N. 16th Street, Philadelphia, have the agency for the Krebs truck.

Stein, S. A., agent for Koehler Trucks, has opened garage at 37 Carpenter Street, Reading, Pa.

Firestone Tire & Rubber Company's Minneapolis branch removed to 1635 Hennepin Avenue.

C. & S. Motor Car Company, 105 S. 10th Street, Minneapolis, Minn., has the agency for the Motokart.

Wagenhals Sales Company, Columbus, Ohio, has the agency for the Wagenhals delivery wagon.

Kelly-Springfield Motor Truck Company, Springfield, Ohio, will open a branch in Memphis, Tenn.

M. B. M. Company, agent for the Wagenhals truck, is now located at 41 Munroe Street, Cambridge, Mass.

Burns-Thomas Company, 228 George Street, New Haven, Conn., has the agency for the Willys-Overland utility car.

Hamilton Truck Company, 294 Central Avenue, Albany, N. Y., has taken over the branch of the International Company.

Bartlett Garages, Philadelphia, have taken the agency for Kelly motor trucks, formerly handled by the Kelly branch in Philadelphia.

Tri City Commercial Garage Company, Davenport, Ia., has been formed by L. G. Smith, L. C. Week and H. A. Donnelly. They will handle Universal trucks.

Stegeman Motor Truck Company, Milwaukee, Wis., has been reorganized. G. A. Mase has given up the agency and the factory has placed one of its men in charge.

Meely Rubber Company of Philadelphia sold its Washington, D. C., branch to the Firestone Tire & Rubber Company, Akron, Ohio. It will be continued as a Firestone branch under the management of J. J. Haas.

International Motor Company, who maintained salesroom at 635 N. Broad Street and service station at 11th and Cambria Streets, Philadelphia, Pa., has moved to 23d and Chestnut Streets.

Locomobile Company of America has located its service, mechanical and financial departments in new building, 61st Street just west of Broadway, New York City. The sales department will remain in old building at Broadway and 75th Street.

Chicago Garage Owners' Association at its annual banquet on December 17th elected the following officers: J. A. Cameron, president; H. J. Murphy, vice-president and chairman of the electric division; W. C. Bode, vice-president and chairman of the gasoline garage division; Fred M. Johns, vice-president and chairman of the livery division; P. R. Higgenbothem, vice-president and chairman of the associate members division; John W. Morsbach, treasurer; H. S. Gilbert, re-elected secretary. Under the new by-laws the president and vice-presidents are the executive board.

General Motors Truck Company, Pontiac, Mich., announces a reduction in price of both gasoline and electric trucks; for instance, a truck that formerly sold for $4500 will now be sold for $3000, and one that was $3250 will now be $2250. The company's guarantee of quality and promise to furnish free any part that may prove defective remains the same as always.

Johns-Manville, H. W., Company, New York City, has acquired the exclusive sale of all models of Carter carburetors. Service stations will be established in all large cities in the United States and Canada, where the Johns-Manville Company's mechanics, specially instructed by the Carter factory, will give real carburetor service to every Carter user. Hugh H. C. Weed, vice-president of the Carter Carburetor Company, will be associated with the Johns-Manville Company as manager of the carburetor department.

Peerless branches in New York and Chicago have been taken over by the C. T. Silver Company and the McDuffee Automobile Company, respectively, in order to reduce the overhead expense incident to using a large building exclusively for the sale of one car. In Chicago, John R. Buck, general manager of the Peerless Motor Car Company, has joined the McDuffee organization, with all the men who have been most successful in developing the Peerless Chicago business, and in New York, the corresponding members of the branch staff have been taken into the C. T. Silver Company.

W. S. SHEPPARD, well-known automobile lubricating oil manufacturer, of Newark, N. J., states that the output of Pennsylvania crude oil has become entirely inadequate to meet the demand, and that automobile oils refined from this product cost much more than the ordinary grade of lubricating oil. He further states that the Pennsylvania product has the most lubricating efficiency under heat and pressure of any oil so far discovered.

AGENCY OPPORTUNITIES

[In this section, each month will be listed the open territory of leading commercial car manufacturers. This affords an opportunity for dealers or those wishing to take on agencies, to learn which makers are seeking agents in their vicinity. — EDITOR.]

South Bend: South Bend Motor Car Works, South Bend, Ind. Open territory in New York City, Kansas City, Mo.; Des Moines, Ia., and the Southwest.

Rowe: Rowe Motor Manufacturing Company, Downingtown, Pa. Open territory anywhere except New York, Cincinnati, California and Southern New Jersey.

Lippard-Stewart: Lippard-Stewart Motor Car Company, Buffalo, N. Y. Open territory in Kansas City, Mo.; Milwaukee, Wis.; Cleveland, Ohio; Memphis, Tenn., and Boston, Mass.

Koehler: H. J. Koehler Sporting Goods Company, 1709 Broadway, New York City. Open territory in San Francisco, Cal.; Portland, Ore.; Omaha and Lincoln, Neb.; Atlanta, Ga.; New Orleans, La., and Galveston, Tex.

Kelly: Kelly-Springfield Motor Truck Company, Springfield, Ohio. Open territory in Albany, Utica, Syracuse and Buffalo, N. Y.; Atlanta, Ga.; Salt Lake City, Utah; Denver, Colo., and Portland, Ore.

Adams: Adams Brothers Company, Findlay, Ohio. Open territory in all States except Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Minnesota, New Hampshire, part of New York, Ohio, Texas and Pennsylvania.

Wichita Falls: Wichita Falls Motor Company, Wichita Falls, Tex. Open territory in Kentucky, Tennessee, Alabama, Georgia, Florida, Montana, South Dakota, North Dakota, Louisiana, Arkansas, part of Texas, Oklahoma, New Mexico, Arizona, Missouri, Iowa, Kansas, Nebraska and northern Mississippi.

Best and Flint: Durant-Dort Carriage Company, Flint Motor Wagon Department, Flint, Mich. Some open territory in all states excepting Iowa, Maryland, District of Columbia and Southern Delaware.

B. A. Gramm's Trucks: Gramm-Bernstein Company, Lima, Ohio. Open territory in Kansas, Nebraska, Oklahoma, Colorado, Wyoming, Florida and certain portions of Illinois, Indiana, North Carolina, South Carolina, Virginia, Pennsylvania, Maryland and West Virginia.

Standard: Standard Motor Truck Company, Detroit, Mich. Open territory in Charlotte, N. C.; Birmingham, Ala.; Dallas and Houston, Tex.; Omaha, Neb.; Kansas City, Mo.; Cleveland, Ohio; Little Rock, Ark.; Salt Lake City, Utah; Winnipeg and Toronto, Canada; Wichita, Kans.; Rochester, N. Y., and Des Moines, Ia.

Conventions of Interest to the Trade

National

January 22-23—at New York City. National Wholesale Dry Goods Association hold convention at Waldorf-Astoria. Convention Bureau of Merchants' Association, Woolworth Building, to prepare.

February 17-18—at Chicago, Ill. National Builders' Supply Association at Hotel LaSalle.

March—at New Orleans, La. National Brick Manufacturers' Association. Twenty-eighth Annual Convention. William Allen, manager of convention and tourists' division of the Association of Commerce, is preparing for event.

March 2-7—at New Orleans, La. National Brick Manufacturers' Association will hold convention at Hotel Grunewald. T. A. Randall, Secretary.

April 22-25—at Savannah, Ga. Convention of National Drainage Congress. Edmund P. Perkins, Chicago, Ill., president.

July 7-9—at New York City. Annual Convention of National Leather and Shoe Finders' Association. Merchants' Association will probably prepare for the event.

State

January 19-22—at York, Pa. Joint Convention of Pennsylvania Dairy Union, Pennsylvania Livestock Breeders' Association and State Horticultural Society to be held. Chamber of Commerce preparing for event.

January 20-21—at Indianapolis, Ind. Retail Lumber Dealers' Association of Indiana, to convene at Hotel Severin.

January 20-21-22—at Denver, Colo. Colorado and Wyoming Lumber Dealers' Association will hold annual convention. R. D. Mundell, Secretary.

January 20-22—at Minneapolis, Minn. Northwestern Lumbermen's Association to convene. Civic and Commerce Association is to prepare for convention.

January 20-22—at New Orleans, La. American Wood Preservers' Association.

January 20-22—at San Antonio, Tex. Annual Convention of the Texas Hardware and Implement Association.

January 20-22—at Hartford, Conn. Convention of Connecticut Dairymen's Association to be held in Unity Hall. J. G. Schwink, Secretary.

January 20-23—at St. Louis, Mo. Missouri Retail Hardware Association Convention at the St. Louis Coliseum. F. X. Becherer, Secretary.

January 20-23—at Fargo, N. D. Grain Growers' Convention.

January 20-24—at Fargo, N. D. Tri-State Grain and Live Stock Growers' Association to hold convention. Commercial Club to prepare for event.

January 27-30—at Indianapolis, Ind. Retail Hardware Association Convention will be held at Tomlinson Hall. M. L. Corey, Secretary, Argos, Ind.

The list of conventions given herewith is published each month so that commercial car manufacturers can communicate with the proper authorities with the idea of arranging to give lectures, illustrated talks, statistics, etc., to show the advantage of motor trucks in these various lines; also possibly to show and demonstrate their cars.

January 30-31—at Albany, N. Y. Retail Lumber Dealers' Association will convene at Ten Eyck Hotel.

February 3-4—at Battle Creek, Mich. Retail Lumber Dealers' Association to convene at Elks' Temple and Post Tavern.

February 3-5—at Fargo, N. D. Northern Dakota & Northwestern Minnesota Implement Dealers' Association to convene.

February 4-5—at Syracuse, N. Y. New York Retail Implement & Vehicle Dealers' Association to convene. Chamber of Commerce preparing.

February 4-6—at Milwaukee, Wis. Retail Hardware Association. Convention at Milwaukee Auditorium. P. J. Jacobs, of Stevens Point, Secretary.

February 9-14—at Baltimore. Retail Hardware Association of Maryland, Pennsylvania, Delaware and New Jersey will hold convention; W. P. Lewis, Huntingdon, Pa., is Secretary.

February 10-13—at Philadelphia, Pa. The Pennsylvania Retail Hardware Dealers' Association will hold exhibition at Third Regiment Armory.

February 10-13—at Waterloo, Ia. Farmers' Grain Dealers' Association of Iowa will hold convention.

February 11-12—at Pittsburgh, Pa. Retail Lumber Dealers' Association will hold convention at Monongahela House.

February 11-13—at Nashville, Tenn. Tennessee Retail Hardware Association to convene. Exhibit at Ryman Auditorium. C. C. Paris, 203 Court Square, Secretary.

February 12—at Concord, N. H. 29th annual convention of Granite State Dairymen's Association to be held.

February 13-14—at Salt Lake City, Utah. Western Retail Lumbermen's Association to convene. Robert Anderson, Logan, is president.

February 17-19—at Milwaukee, Wis. Wisconsin Retail Lumber Dealers' Association will hold annual convention.

February 17-19—at Parkersburg, Va. Virginia Retail Hardware Association to convene. A. A. Doak, Crafton, W. Va., is Secretary.

February 17-20—at Rochester, N. Y. Retail Hardware Association of New York to convene and hold exhibit in City Exposition Building. John B. Foley, of Syracuse, Secretary.

February 17-20—at Lincoln, Neb. Nebraska Retail Hardware Association to convene. Exhibit to be held at Lincoln Auditorium. Nathan Roberts, Secretary.

February 17-20—at Des Moines, Ia. Convention and exhibition Iowa Retail Hardware Association at Des Moines Coliseum. A. R. Sale, Secretary.

February 17-20—at Kalamazoo, Mich. Michigan Retail Hardware Association to convene at New Burdick Hotel. Exhibit to be held at State Armory. J. Charles Ross, manager.

February 18-20—at Fargo, N. D. Retail Hardware Association Convention. C. N. Barnes, Secretary, Grand Forks.

February 24-27—at Minneapolis, Minn. Convention Minnesota Retail Hardware Association. H. O. Roberts, Secretary.

February 25-27—at Lexington, Ky. Kentucky Retail Hardware Association. Convention and Exhibit. I. M. Stone, Sturgis, Ky., Secretary.

March—at San Francisco, Cal. Convention of California State Retail Dealers' Association.

March 2-5—at Boston, Mass. New England Retail Hardware Association. Convention and exhibit will be held in Horticultural Hall. D. Fletcher Barber, of this city, is Secretary.

March 3-5—at Sioux Falls, S. D. Retail Hardware Association of South Dakota. E. C. Warren, of Pierre, S. D., Secretary.

April—at Albany, N. Y. Convention of New York State Embalmers' Association. William S. Drinkwater, New York City, president.

April 7-9—at San Antonio, Tex. Lumbermen's Association of Texas to convene. The association's headquarters are at Houston.

May—at Indianapolis, Ind. Convention National Retail Hardware Association. M. L. Corey, Secretary, Argos, Ind.

May 5-7—at Little Rock, Ark. Retail Hardware Association of Arkansas, to convene in this city. Grover T. Owen, of this city, is Secretary.

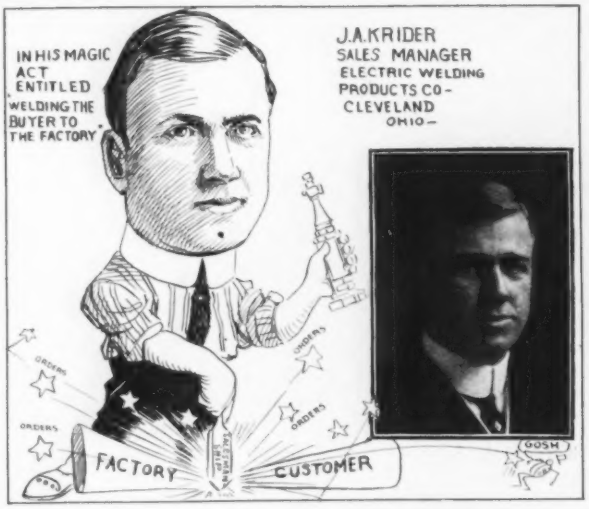
May 26-27—at New York City. Board of Governors of the American Manufacturers' Association will hold convention. Merchants' Association will probably have charge of the event.

June 16-17-18—at Des Moines, Ia. Iowa Retail Merchants' Association will hold annual convention.

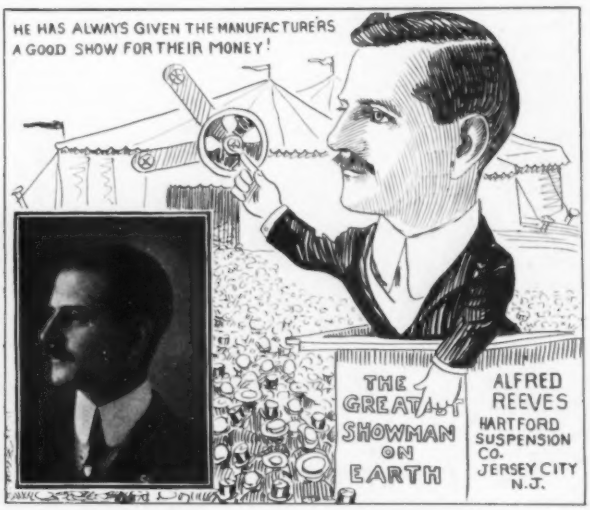
July 7-9—at Raleigh, N. C. Retail Hardware Association of Carolina. T. W. Dixon, of Charlotte, N. C., is Secretary.

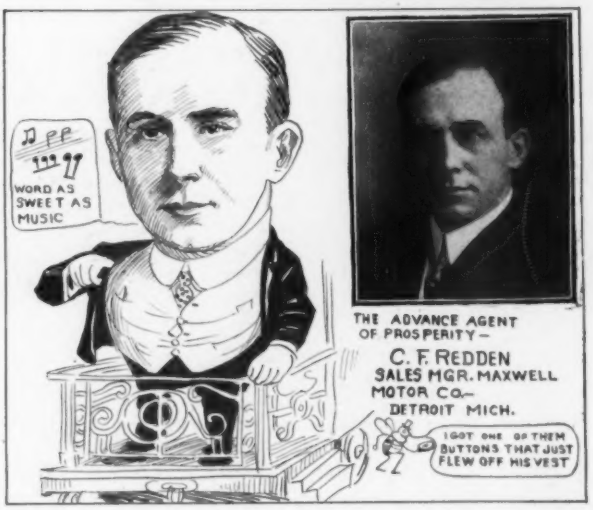
July 14-16—at Cedar Point, Ohio. Ohio Retail Grocers' & Meat Dealers' Association to hold 15th annual convention.

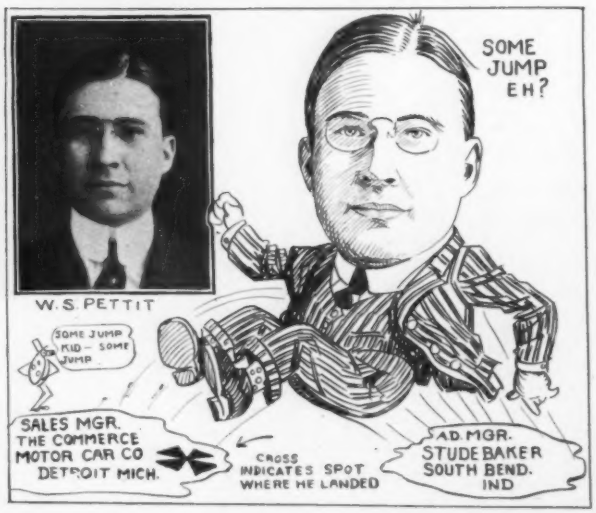
C C J GALLERY of SALES MANAGERS



JOHN RANDOLPH CAUTLEY—
SALES MGR. CHAIN DEPT. PETER A. FRASSE & CO
N.Y.
HUYLER BUG SAYS
THIS IS ONLY ONE BOY'S SUPPLY OF HIS CANDY
CUSTOMER
HUYLERS
HIS CHAIN ARGUMENTS ARE TOO STRONG TO LET ANY OF HIS PROSPECTIVE CUSTOMERS GETAWAY FROM HIM—


HE HAS ALWAYS GIVEN THE MANUFACTURERS A GOOD SHOW FOR THEIR MONEY!
THE GREATEST SHOWMAN ON EARTH
ALFRED REEVES
HARTFORD SUSPENSION CO.
JERSEY CITY N.J.


WORD AS SWEET AS MUSIC
THE ADVANCE AGENT OF PROSPERITY—
C. F. REDDEN
SALES MGR. MAXWELL MOTOR CO—
DETROIT MICH.
I GOT ONE OF THEM BUTTONS THAT JUST FLEW OFF HIS VEST


SOME JUMP EH?
W.S. PETTIT
SOME JUMP KID— SOME JUMP
SALES MGR. THE COMMERCE MOTOR CAR CO DETROIT MICH.
CROSS INDICATES SPOT WHERE HE LANDED
AD. MGR. STUDEBAKER SOUTH BEND. IND

HIS DREAM
R.P. JOHNSON. WARNER GEAR CO. MUNCIE IND—
ALSO WM. S.M.
BE IT GAME OR SALES ITS ALL THE SAME THEY CAN'T GET AWAY FROM HIM
THIS IS AN ISLAND OFF THE COAST OF FLORIDA

Annual Winter Meeting of S. A. E.

S. A. E. Banquet

The Society of Automobile Engineers banquet, at the Hotel Plaza on Thursday evening, January 8th, was attended by over five hundred of the two thousand members. These men gathered from all parts of the United States, and were truly a representative body. President-elect Leland owing to illness of his family, was unable to be present, and speeches were made by Past-president Howard Marmon, of the Nordyke & Marmon Company, and by Past-president Henry Souther. The latter spoke on the subject of standardization and the remarkable progress which the society had made in this work in the last two years. He made a very strong plea for co-operation not only by personal effort, but by financial support on the part of business men, and showed how the business man could assist the automobile engineer by giving his support, by becoming a member of committees, and by financially assisting the work. The standards committee now contains over one hundred members, and is divided and sub-divided into smaller committees, each member being selected by the council of the society with reference to his fitness for the problem in hand. To make this matter clear, we quote from his remarks as follows:

"The business man finds himself in intimate contact with the engineer member. The consumer and producer, face to face, reconcile differences that seem unsurmountable. Any action taken becomes recommended practice or a standard, and once done remains recommended practice until the committee again acts because some worthy improvement shows itself.

"Under non-standard practice the producer must go through the same line of argument with every consumer with whom he comes in contact, thereby doing over and over again what is settled once and for all in our committees.

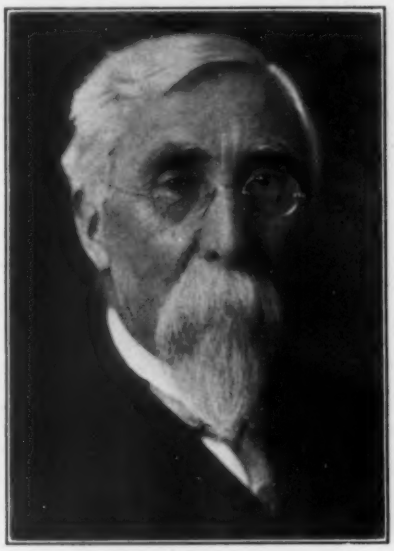
"The findings and knowledge gained by the standards committee are distributed among the membership by means of printed transactions, monthly bulletins, and data sheets."

In proof he pointed out the great success which has attended the efforts of the society, showed the work that it has done for the industry as a whole, and made a plea for the recognition that the society has earned.

After the banquet the members were entertained by a vaudeville performance.

Evening Session, Tuesday, Sixth

The Commercial Vehicle Session was well attended, the meeting taking up first the report of the Truck Standards Division by W. P. Kennedy. The General Committee's recommendation of wheel sizes of 32, 36 and 40 in. for trucks, and 16 and 20 in. for industrial trucks, was put to a vote, passed, and becomes recommended practice of the Society. Arthur J. Slade's introductory paper preceded the regular papers of V. V. Torbensen on the Internal Gear Drive, B. B. Bachman on Double Reduction Drive Axles, and John Younger on Worm Gears, and H. D. Church on Side Chain Drives. The subject of Final Drives for trucks was then thrown open for discussion. Some interesting information was given by John Younger, of the Pierce-Arrow Company, on worm efficiency, as follows: 73.5 per cent. total efficiency, including motor, clutch, shaft and rear axle units on second gear, 84 per cent. direct drive, showing only 10 per cent. difference, most of which could be accounted for by the use of the indirect gear, showing that the efficiency of the worm is about the same at slow speeds and heavy pulling, as at high speeds. It was pointed out that over 4000 'buses in Europe were using worm drives satisfactorily, and that these machines made from 1300 to 1500 stops and starts a day. The opinion of the meeting was that the worm drive was decidedly on the increase and would increase very markedly in the next few years, but not to the exclusion of any other type of final drive.



HENRY M. LELAND
New president of the S. A. E.

The following paper was then read by John Younger as an extra on the subject of fenders for trucks:

PROPOSED FENDER REGULATIONS

By JOHN YOUNGER

(Read before the Annual Meeting of the S. A. E., New York City, January, 1914.)

The subject of providing safety fenders or life guards on trucks has come very forcibly to the front within the last few weeks. Chicago and Detroit already possess ordinances requiring such guards and many other cities are seriously considering following their example. The subject is of such vital importance to engineers that through the courtesy of Mr. Cumner and Mr. Clarkson, I have been asked to introduce it at this meeting.

First of all, I believe that we individually and as a Society would welcome a fender which would actually save life, provided that such fender were made in a sound workmanlike manner, of sound engineering design, capable of being easily applied, of being maintained in good repair easily, and at low cost.

Such a fender would have our support, but we should strongly deprecate any legislation compelling us at short notice to put on any makeshift, untried device, which looks as if it would save life. I will briefly state a few reasons why the question of adopting life guards on trucks should be very carefully considered.

On December 29, 1908, the Public Service Commission for the First District State of New York reported on car fenders and wheel guard tests. Copies of this report can be obtained from 154 Nassau Street, New York City, at the price of 50 cents. This report should be in the hands of everyone interested in the development of the motor truck. The tests were made of life-size dummies, very carefully made as to represent actual men and women and in noting extracts, it must be remembered that the remarks apply to street cars running over a fairly good roadbed in a fixed direction.

I will now proceed to read a few extracts.

Page 1.—"If maintenance is too high, the company will neglect to maintain them in an efficient condition." Some devices had merit as life savers when new, but they were complicated and were such that it would be a serious matter to maintain in reliable condition. Devices of this kind could not be recommended by the Commission.

(Note.) Already in Detroit, fenders are to be seen all patched up and practically inefficient. Such fenders cannot be maintained easily and are a source of danger, not of safety.

Page 7.—The tests have shown that car fenders are like any other class of machinery. They must be gradually developed and then be tested many times in actual use before they are available for service.

Wheelguards made up entirely of fingers pressed to the pavement when in action did not give the results anticipated by inventors of devices of this class, as the fingers when dropped to the ground invariably struck the dummy on the rebound and either pushed it along or mangled it among the fingers tending to reduce greatly its ability to get the victim onto the apron.

Note how inapplicable this is to trucks traveling over the most varied roads.

Page 8.—It was demonstrated that wearing apparel often caused the failure of a device by trailing on the pavement, getting under the fender and dragging the body with it. It was found necessary to exercise a pressure of not less than 100 lbs. down on the pavement to prevent this.

Note again how the inaccuracies of the ordinary roadbed would militate against the successful working of a fender on truck.

Page 8.—It is desirable to keep device as narrow as possible.

(Note). This question of width is very important from the viewpoint of the truck owner. The diagram, herewith, shows how ineffectual even a fairly wide fender is in steering around traffic.

Page 9.—In the selection of a fender, the railway manager must give consideration to the practicability of the device he adopts to suit the operating conditions of his road.

(Note.) In other words, the street car fender has fixed conditions to conform to; the truck fender has most varied conditions.

The gist of the whole report is this that very careful and elaborate tests should be made before deciding on a fender, and that very many fenders which would seem to be valuable were actually more dangerous than if not used.

To return to our special truck conditions, a fender designed by a well-known fender company projects 28 in. in front of the truck, and is 6 ft. 6 in. wide. This adds 10 per cent. to the overall length of our five-ton truck, and 15 per cent. to our two-ton truck. This is objectionable as it is added at a point in front of driver. On our five-ton truck, the driver's eye is 11 ft. away from the fender extremity, and by reason of the radiator, mudguards, etc., being in his way, is not able to judge of the wisdom of dropping his fender or not.

Again, how is he to drop his fender? One hand is on the steering wheel; the other at the brake lever; a foot on the clutch pedal and the other on the brake pedal. He must be a wise, cool-headed driver who would remember what to do in an emergency.

The greatest danger in my mind, lies in the projection of the fender when turning curves. The driver's attention is concentrated in a direction at right angles to where his fender is probably breaking a traffic policeman's ankle. Besides, one wheel is left unguarded at this operation. On our five-ton truck a straight fender nearly 13 ft. wide would be required to thoroughly guard the truck. A curved fender would be somewhat shorter but horribly complicated.

A device which does not fit closely to the ground is not a life guard, it is a trap. It is practically impossible to drop a fender closely to a rough road without its being damaged by the road to such an extent that it is quite conceivable it would present a jogged spiked weapon to the unfortunate victim, instead of a comfortable couch.

Personally, I would rather take a chance and take advantage of the 12-in. clearance between the wheels of a truck than of being hit with any fender I have seen yet.

A fender would certainly trip me up and throw my head against the radiator with some force instead of rebuking my carelessness in a gentle manner.

In conclusion, I will read a letter under date of December 18, 1913, from Mr. Iden, Chief Engineer of the London General Omnibus Company, who, you will remember, run about 3000 omnibuses through very congested traffic, and whose damage claims are such that they are very earnest in their search for a real life saver.

"In reply to your letter of the 4th instant, during the past year, we have made up and tested a number of front guards, but we regret to say that up to date we have not found one efficient enough to warrant fitting to our buses.

"The early types of lifeguard, which we tried, were more in the nature of fenders or gates, but these were found unsatisfactory in cases where a person had fallen prone, when the limbs invariably were drawn under the guard, and more damage was done than if there had been no guard and they had been run over by the wheel.

"We have tried a trip guard similar to that used on tram cars, but this, to be effective, had to have too great a projection to allow us to adopt such a device.

"Other types of device have been in the nature of brushes constructed to sweep the person in front or aside. This was very unsatisfactory, as it collected so much road refuse, besides in dry weather creating such a dust, that it was impossible to leave such a device on the bus.

"So far, the most effective device which we have tried has been in the nature of a rubber-covered wheel, which is held against the road wheel by a slight spring and, being in contact with same, caused the rubber covered wheel to rotate in the reverse direction, thus, when this met an object, it would tend to roll it away rather than draw it in under the wheel.

"All our earlier devices were of our own design, but latterly we advertised in all the leading journals for suggestions and, as a result, received 4700 replies and, included in these, was the one with the wheel rotating in the reverse way to the road wheel, as before mentioned, but other than this, no suitable guard was found among all the devices submitted."

Mr. Iden adds a postscript that the wheel referred to is not sufficiently good for them to use.

In view of this letter, is it not exceedingly unwise to adopt any hasty legislation until something reliable can be obtained?

Short discussional papers were then read on the same subject by B. B. Bachman, C. T. Meyers and R. M. Lloyd. The motion was passed that the S. A. E. go on record as being opposed to the introduction of truck fenders on the ground that they do not accomplish the purpose intended, and merely hinder the development of the Commercial Car industry.

Mr. Coombs reported for the Historical Committee of the S. A. E. in regard to establishing a museum for original automobile specimens, parts, licenses and all other pioneer devices and documents pertaining to the automobile industry, the idea being to establish a fund and a permanent museum of these soon-to-be-historical relics.

J. A. Anglada read his paper on gasoline locomotives for mines, followed by T. V. Buckwalter's paper on Development of the Electric Tractor for Handling Freight Cars Over Tracks Laid on City Streets, and the meeting closed with Taxicab Specifications, a paper by L. P. Prossen.

DOUBLE-REDUCTION LIVE AXLE*

TEN YEARS, as measured in terms of the development of the automobile, is a long time, and in this period we have seen many struggles between different forms of construction. Not very long ago the advertisements of rival manufacturers were filled with lengthy expositions on the relative merits of their own peculiar features of construction.

In January, 1902, at the New York show there was on exhibition one model only equipped with shaft drive. In January, 1913, the conditions were almost if not entirely reversed. However, if the chain drive was defeated for use in pleasure cars, it seemed that with the advent of the commercial vehicle, a field of usefulness was opened for this form of construction where it could not be supplanted. In spite of this we find a growing tendency both here and abroad to use one of several forms of shaft-drive construction.

I have been asked to contribute something in explanation of the construction of, and the results obtained from, the double-reduction form of shaft drive. The company with which I am connected claims the distinction of having made the first shaft-driven car offered for sale in this country, and also of having built the first chassis for strictly commercial uses equipped with a live axle.

Construction

The axle as we are building it to-day is the result of eleven years' experience, and is illustrated in connection with this article.

The primary reduction, which is 1.78 to 1, is in the bevel-gear set. The secondary reduction of 4 to 1 is in the spur-gear set. This arrangement offers several very desirable advantages. In the first place it admits of obtaining a straight-line drive by placing the spur pinion above the gear. This is an especially valuable feature where it is necessary to mount the motor high in the chassis to escape front axle interference.

The second advantage is that with the relatively small bevel gears these parts are much easier to manufacture than they would be were the ratio greater. At the same time, due to the fact that they are not working under as high torque values as the secondary set, the thrust of the gears is easier to provide for. For the same reason the bevel gears with their weaker tooth forms are working under the most favorable conditions. Conversely, the spur gears are better able to take care of the high torque values of the secondary reduction, and the differential carrier bearings are relieved of the high thrust-load which they would be required to bear if bevel gears were used.

The gears are all mounted on Timken bearings and are carried on the removable cover-plate which bolts to the front of the axle casing. The rear opening of the casing is covered by an inspection cover which gives access for inspection and adjustment.

(*Continued on page 65.*)

*Extract from paper presented by B. B. Bachman, assistant engineer of the Autocar Company, before the annual meeting of the Society of Automobile Engineers, January 6, 1914.

On the other side of this leaf will be found the key to the abbreviations used in the

Buyers' Information Commercial Car Review

While consulting the Review, turn this leaf out so that it extends beyond the book, it will then be convenient for reference, no matter how many pages you turn to.

Indexes arranged alphabetically and according to price will be found on pages 46-47.

KEY OF ABBREVIATIONS

Used in the Specifications of Cars in the BUYERS' INFORMATION COMMERCIAL CAR REVIEW

Chassis Weight: Given in pounds and includes weight of chassis only.

Price: In the table the prices are for chassis only, unless marked with an asterisk (*), in which case they are complete car prices. In the captions, prices are of the car complete as shown in the illustration, unless otherwise stated.

Horse Power: Calculated by the S. A. E. formula, H. P. $= \frac{D^2N}{2.5}$; 2-cycle engines by the modified formula, H. P. $= \frac{D^2N}{1.515}$ where D = bore in inches, N = number of cylinders.

Cylinders Cast: S, singly; P, pairs; B, en bloc; T, in threes; E, singly, assembled en bloc.

How Cooled: A, air; T, thermo-syphon; G, gear pump; C, centrifugal pump; W, water.

Type of Radiator: H, honeycomb; P, planetic; T, tubular; C, cellular; V, vertical.

Carburetor Make: A, Atlas; B, Breeze; BD, Breeze Detroit; BE, Bennett; C, Carter; CH, Chapin; CL, Claudel; CRG, C.R.G.; D, Dayton; E, Excelsior; F, Flechter; FL, Falls; GA, G. & A.; H, Holley; HN, Harroun; HR, Heitger; HT, Hoyt; K, Kingston; KD, KD; KR, Krice; M, Marvel; MA, Macos; MO, Model; MY, Mayer; N, Newcomb; NM, New Miller; O, optional; P, Polyroe; PL, Planhard; R, Rayfield; S, Stewart; SB, Stromberg; SC, Scott; SD, Standard; SI, Simms; SL, Schebler; SP, special; V, Vortex; Z, Zenith; ZP, Zephyr.

Ignition: A, Atwater Kent; B, Bosch; BL, Berling; BR, Briggs; BS, Briggs & Stratton; C, Connecticut; D, Delco; E, Eisemann; H, Heinze; K, Kingston; KW, K-W; LL, Lutz-Lockwood; M, Mea; MI, Michigan; MR, Motsinger; MY, Mayer; O, optional; P, Pittsfield; PF, Pfanstiehl; R, Remy; S, Simms; SD, Splitdorf; SP, special; SW, Swiss; UH, U. & H.; V, Volta; W, Western Electric; WI, Witherbee; WS, Westinghouse; WY, Wyco.

Spark Plug Size: S, S. A. E.; ⅛, ½ in. pipe; M, Metric.
(Note) Spark plug sizes: S. A. E.—⅞ in. diameter, 18 threads straight; ½ in. pipe size—13-16 in. diameter, 14 threads, tapered; Metric—18 mm. diameter, 1.5 mm. pitch (approx. 23-32 in. diameter, 17 threads).

Style of Drive: B, bevel gear; C, chain; E, electric; F, friction; S, shaft; SP, spur; W, worm; V, V belt.

Style Speed Change: F, friction; H, hydraulic; IC, individual clutch; L, planetary; P, progressive; S, sliding.

Tires: Solid unless otherwise indicated—*, pneumatic; D, dual; T, triple; †, steel; C, cushion.

Control or Driver's Position: C, center; L, left; O, optional; R, right.

Engine Starter: A, compressed air; E, electric; G, gas; S, spring.

Additional ABBREVIATIONS USED ON ELECTRICS

Motor Type: GE, general electric; SS, series-wound.

Battery Make: E, Edison; EX, Exide; G, Gould; P, Philadelphia; O, optional; ES, Electric Storage Battery Co.

Battery Capacity: Given in Ampere hours.

Controller: C, continuous torque; GE, General Electric.

Type Rear Axle: D, dead; E, floating; S, semi-floating; ¾, ¾ floating.

Indexes arranged alphabetically and according to price, will be found on pages 46 and 47

Buyers' Information Commercial Car Review

(*Eastern Section*)

On the following pages is given a complete review of the Commercial Car Models which will be manufactured for the coming season by Eastern American Manufacturers.

See Complete Indexes on Pages 46 and 47

THIS is the first or Eastern Section of the Review, and includes cars manufactured in the following states: Connecticut, District of Columbia, Kentucky, Maryland, Massachusetts, New York, New Jersey, North Carolina, Ohio and Pennsylvania.

The second or Western Section will be issued February 15th, and will contain a review of cars made in the following states: California, Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Texas, Utah and Wisconsin.

The data given in this Review was supplied direct by the makers, and is as correct as can be obtained. Any omissions or inaccuracies which occur are due to imperfect information given us by makers.

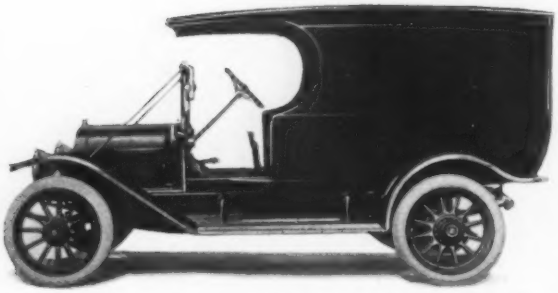
Key to Abbreviations will be found on the leaf attached to this page; when this is opened out it will be found very convenient to refer to, no matter which pages of the Review are consulted. Indexes will be found on pages 46 and 47.

Criticism and Suggestion of this Buyers' Information Review is invited. We want to know whether it meets requirements and how it can be made better, if possible.

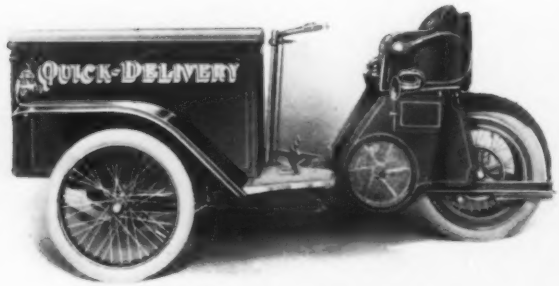
Horse-Power Formula.---All horse-powers are calculated by the S. A. E. formula: H. P. $=\frac{D^2N}{2.5}$; 2-cycle engines by the modified formula, H. P. $=\frac{D^2N}{1.515}$ where D = bore in inches and N = number of cylinders.

MOTOKART MODEL 1, 500-LB. BOX BODY, $400.
Made by Tarrytown Motor Car Co., Inc.

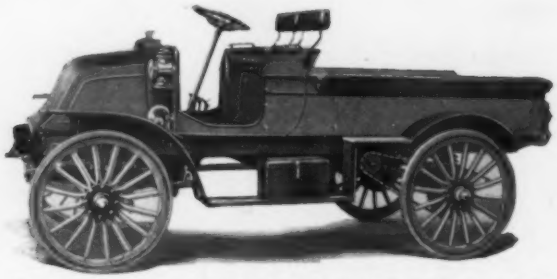
MAXIM MODEL F, 750-LB. TRICAR, $425.



WILLYS-OVERLAND MODEL 79, 750-LB. PANEL BODY, $950.
This chassis also supplied with express body, $900.



LIGHT 750-LB. BOX BODY TRICAR, $475.
Carrying space, 44x28x26.



BROCKWAY MODEL F, 1000-LB. FLARE BOARD, $1250.
Carrying space, 74x46. This chassis also supplied with stake body, carrying space, 86x44, $1300.

500 Pound Gasoline

Model	Chassis Weight	Chassis Price	Dimensions of Carrying Space	Height Load P'Fm	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	Cooling	Radiator
Tarrytown Motor Car Co., Inc., New York City.												
1	700	*400	50x32x32	..	30	11	2	3.62	4		S	T	H
Rex Machine Works, Brooklyn, N. Y.												
Rex	....	....	.....	18	30	*15	3	2.75	3		S	A	..

600 Pound Gasoline

Touraine Co., Philadelphia, Pa.													
....	....	*550	42x56x53	24	25	14	4	3	4.5		B	T	T

750 Pound Gasoline

Maxim Tricar Mfg. Corp., New York City.													
F	700	375	55		22	25	8	2	3.25	4.5	S	A	..
Willys-Overland Co., Toledo, O.													
79	2000	*900	.....	28	40	27	4	4.12	4.5		S	T	H
Light Commercial Car Co., New York City.													
....	500..	*475	45 x 28 x 26	35	18	10	2	3.67	3.5		S	A	..

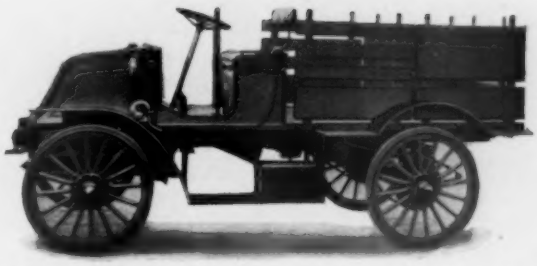
1000 Pound Gasoline

Brockway Motor Truck Co., Cortland, N. Y.													
A	2400	1055	45		34	15	*32	3	4	5	S	A	..
A-2	2400	1155	45		34	15	*32	3	4	5	S	A	..
F	2500	1205	86x44		34	15	32	4	3.5	5	B	T	C
G	2500	1305	.....		34	15	32	4	3.5	5	B	T	C
Gabriel Auto Co., Cleveland, O.													
K	1800	1000	.....	32	25	20	4	3.5	5		B	T	H
Krebs Commercial Car Co., Clyde, O.													
E	2000	950	42x67	30	..	20	4	3.5	4		P	C	T
Sullivan Motor Car Co., Rochester, N. Y.													
20	1800	925	.....	32	18	16	2	4.5	4.5		S	T	V

1250 Pound Gasoline

Tiffin Wagon Co., Tiffin, O.													
A	2700	1600	.....	41	16	23	4	3.75	4.5		B	T	V

TIFFIN MODEL A, 1250-LB. STAKE BODY, CHASSIS, $1600.



BROCKWAY MODEL A, 1000-LB. STAKE BODY, CHASSIS, $1055.
This chassis also supplied with panel body, carrying space, 72x45, $1400.

Commercial Cars

Carburetor	Ignition	Spark Plug Size	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering & Control	Wheelbase	% Weight on Rear Wheels	Engine Starter
Tarrytown Motor Car Co., Inc., New York City.											
..	..	½	C	F	..	*26x2½	*26x2½	C	69	..	..
Rex Machine Works, Brooklyn, N. Y.											
SL	..	½	V	..	..	*	*	..	92	67	..

Commercial Cars

Touraine Co., Philadelphia, Pa.											
SP	A	S	B	S	3	*28x3	*28x3	R	88	..	..

Commercial Cars

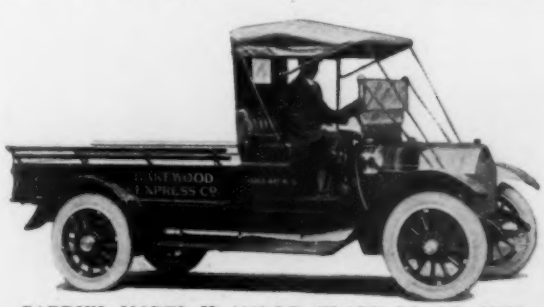
Maxim Tricar Mfg. Corp., New York City.											
H	B	½	C	S	2	*28x3	*28x3	C	97	66	..
Willys-Overland Co., Toledo, O.											
SL	SD	..	B	S	3	33x4	33x4	R	114	..	..
Light Commercial Car Co., New York City.											
..	..	..	F	F	2	*26x3	*26x3	C	66	60	..

Commercial Cars

Brockway Motor Truck Co., Cortland, N. Y.											
H	B	S	C	L	2	36x2½	36x3	L	100	70	..
H	B	S	C	S	3	36x2½	36x3	L	100	70	..
H	B	S	C	L	2	36x2½	36x3	L	100	70	..
H	B	S	C	S	3	36x2½	36x3	L	100	70	..
Gabriel Auto Co., Cleveland, O.											
SB	B	S	B	S	3	*	*	L	108	60	..
Krebs Commercial Car Co., Clyde, O.											
K	B	S	B	S	3	*32x3½	*32x3½	L	100	60	..
Sullivan Motor Car Co., Rochester, N. Y.											
SL	B	½	C	L	2	36x2½	36x2½	L	96	60	..

Commercial Cars

Tiffin Wagon Co., Tiffin, O.											
BD	B	S	..	S	3	.....	.....	L	112	60	..

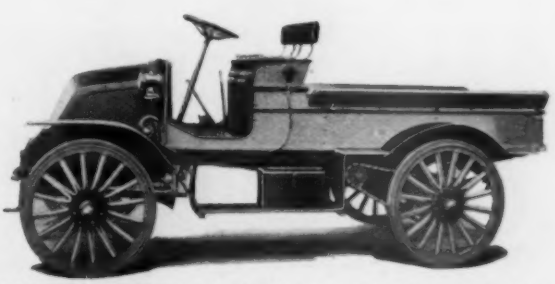


GABRIEL MODEL K, 1000-LB. FLARE BOARD, $1150.
This chassis also supplied with panel body, $1250; stake body, $1200.

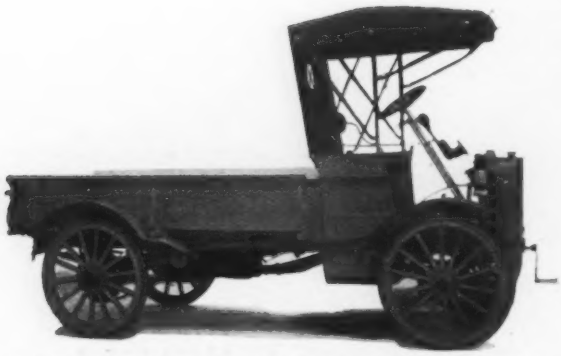
VIM 600-LB. PANEL BODY, $550.
Carrying space, 42x56x53.
Made by the Touraine Co.

KREBS MODEL E, 1000-LB. PANEL, $1150.
Carrying space, 68x56x42. This chassis also supplied with flare board body, 67x42, $1000.

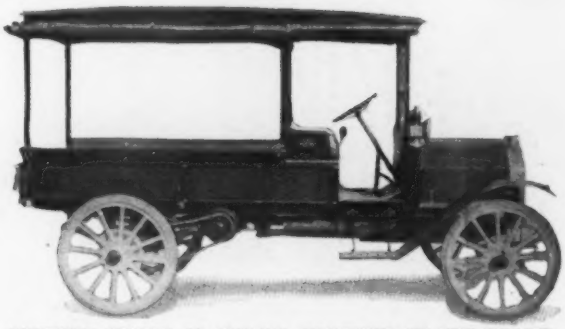
BROCKWAY MODEL G, 1000-LB. FLARE BOARD, CHASSIS, $1305.
This chassis also supplied with panel body, carrying space, 72x45, $1400.



BROCKWAY MODEL A2, 1000-LB. FLARE BOARD, CHASSIS, $1155.
This chassis also supplied with panel body, carrying space, 72x45, $1400.

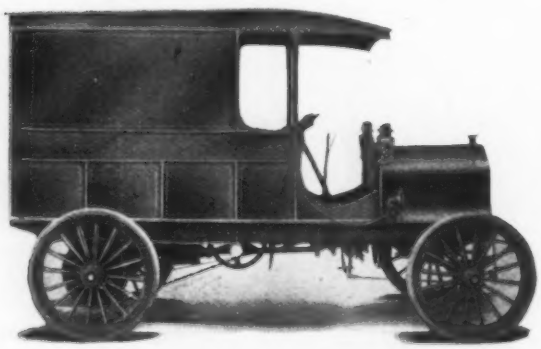


AUGLAIZE MODEL H, 1500-LB. FLARE BOARD, $1000.
This chassis also supplied with panel body, $1200; stake body, $1000.



SIEBERT MODEL H, 1500-LB. COVERED FLARE BOARD, $1350.

ATTERBURY MODEL A, 1500-LB. PANEL BODY.



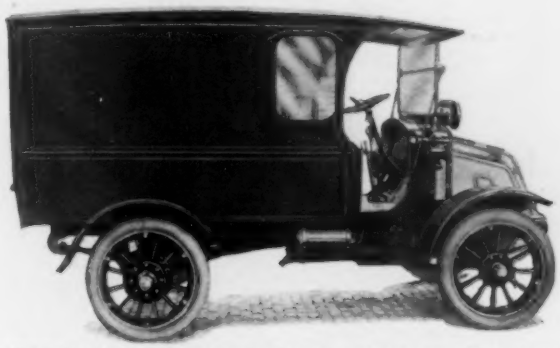
KEARNS MODEL A, 1500-LB. PANEL BODY, $1100.
This chassis also supplied with stake body, $1050; flare board body, $1000.

ROWE MODEL A, 1500-LB. FLARE BOARD, $1800.

1500 Pound Gasoline

Model	Chassis Weight	Chassis Price	Dimensions of Carrying Space	Height Load P'f'm	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	Cooling	Radiator
Auglaize Motor Car Co., New Bremen, O.												
H	2240	950	.....	30	15	13	2	4	5.25	S	W	V
Atterbury Motor Car Co., Buffalo, N. Y.												
A	2300	....	.....	34	20	20	4	3.5	5	B	W	T
Bowling Green Motor Car Co., Bowling Green, O.												
F	2600	1500	.....	31	20	20	4	3.5	5	B	T	H
Gabriel Auto Co., Cleveland, O.												
H	2700	1500	.....	34	25	23	4	3.75	5.25	B	C	H
Huselton Motor Car Co., Butler, Pa.												
....	2400	1650	.....	36	20	23	4	3.75	5.5	B	C	V
Krebs Commercial Car Co., Clyde, O.												
BB	2500	1425	46x82	34	20	23	4	3.75	4.5	B	T	T
Kearns Motor Truck Co., Beavertown, Pa.												
A	1950	900	.....	36	20	20	4	3.5	4	P	C	V
Lippard-Stewart Motor Car Co., Buffalo, N. Y.												
C	2500	1650	84x43	28	25	23	4	3.75	5.25	P	C	T
C	2500	1650	84x43	28	25	23	4	3.75	5.25	P	C	T
Maccarr Co., Allentown, Pa.												
A	3000	1650	.....	32	25	23	4	3.75	5.25	B	C	V
Rowe Motor Mfg. Co., Downingtown, Pa.												
A	....	1690	....	25	23	4	3.75	5		B	T	..
Shop of Siebert, Toledo, O.												
H	2400	1250	84x46	32	20	23	4	3.75	4.5	B	T	H
Willys-Overland Co., Toledo, O.												
Utility	2800	1350	.....	28	18	27	4	4.12	4.5	S	T	H
Trabold Truck Mfg. Co., Johnstown, Pa.												
....	2400	975	96x42	38	31	20	4	3.5	5	B	T	H
Sandusky Auto Parts & Motor Truck Co., Sandusky, O.												
B	2700	1650	90x46	32	24	23	4	3.75	5	B	C	C

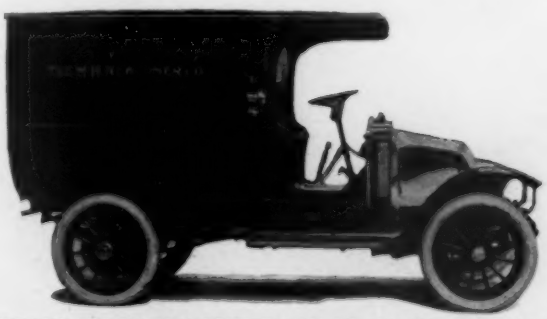
GABRIEL MODEL H, 1500-LB. COVERED FLARE BOARD, $1650.
This chassis also supplied with panel body, $1750; stake body, $1700.



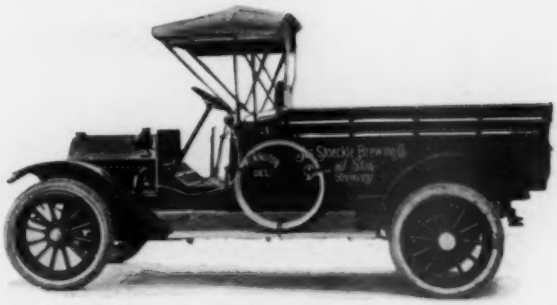
KREBS MODEL BB, 1500-LB. PANEL BODY, CHASSIS, $1425.
Carrying space, 80x46. This chassis also supplied with flare board body, 82x46, $1525; screen side, 82x55x46, $1600.

Commercial Cars

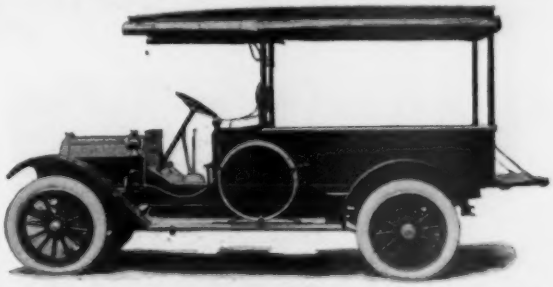
Carburetor	Ignition	Spark Plug Size	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering & Control	Wheelbase	% Weight on Rear Wheels	Engine Starter
Auglaize Motor Car Co., New Bremen, O.											
SL	R	½	C	L	2	.....	.....	R	96	60	..
Atterbury Motor Car Co., Buffalo, N. Y.											
SB	B	S	W	S	3	*37x5	*37x5	L	118	70	..
Bowling Green Motor Car Co., Bowling Green, O.											
SL	BR	S	C	S	3	36x3½	36x3½	L	136	..	..
Gabriel Auto Co., Cleveland, O.											
SB	B	S	B	S	3	*	*	L	126	60	..
Huselton Motor Car Co., Butler, Pa.											
SB	B	S	B	S	3	*	*35x4½	L	126	69	..
Krebs Commercial Car Co., Clyde, O.											
SL	B	S	B	S	3	*34x4	*34x4	L	100	63	..
Kearns Motor Truck Co., Beavertown, Pa.											
SL	R	½	C	F	..	36x2	.....	R	100	60	..
Lippard-Stewart Motor Car Co., Buffalo, N. Y.											
R	E	..	B	S	3	35x4½	35x4½	L	125	70	..
R	E	..	W	S	3	35x4½	35x4½	L	125	70	..
Maccarr Co., Allentown, Pa.											
SB	B	S	B	S	3	*	*	L	132	66	..
Rowe Motor Mfg. Co., Downingtown, Pa.											
..	..	..	IG	..	3	*	*	R	120	..	..
Shop of Siebert, Toledo, O.											
C	M	S	C	S	3	36x3	36x3½	L	120	70	..
Willys-Overland Co., Toledo, O.											
SL	SD	..	C	S	3	34x4½	36x3½	R	120	..	..
Trabold Truck Mfg. Co., Johnstown, Pa.											
SB	BR	M	C	L	2	36x2½	38x3	..	105	70	..
Sandusky Auto Parts & Motor Truck Co., Sandusky, O.											
SL	O	S	C	S	3	*34x4	*34x4½	L	120	..	..



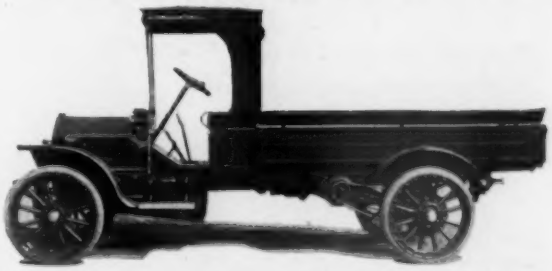
LIPPARD-STEWART MODEL B, 1500-LB. PANEL BODY, $1800.
Carrying space, 84x43x59. This chassis also supplied with stake body, 96x58, $1800; flare board, 84x43, $1775; covered express, $1775.



MACCARR MODEL A, 1500-LB. FLARE BOARD, CHASSIS, $1650.

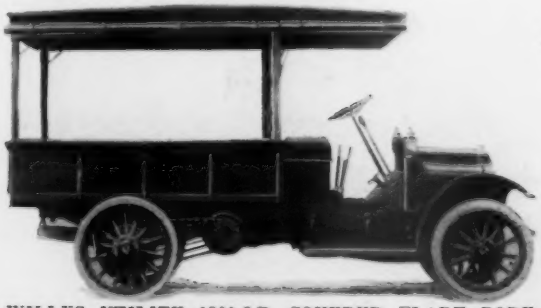


MACCARR MODEL A, 1500-LB. COVERED FLARE BOARD, $1825.

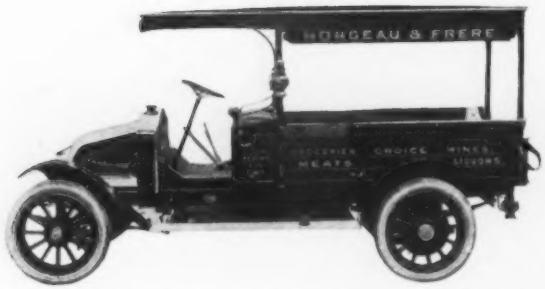


MODERN MODEL F, 1500-LB. FLARE BOARD, CHASSIS, $1500.
Made by Bowling Green Motor Car Co.

BUTLER 1500-LB. COVERED EXPRESS, $1775.
Carrying space, 104x48. This chassis also supplied with flare board body, same carrying space, $1750.
Made by Huselton Motor Car Co.



WILLYS UTILITY 1500-LB. COVERED FLARE BODY CHASSIS, $1350.



STEWART MODEL B, 1500-LB. COVERED FLARE BOARD, $1625.
This chassis also furnished with stake body, $1625.

STEWART MODEL A, 1500-LB. PANEL BODY, $1650.

SANDUSKY MODEL B, 1500-LB. PANEL BODY, $1600.

BROCKWAY MODEL C, 2000-LB. PANEL BODY, CHASSIS, $1490.

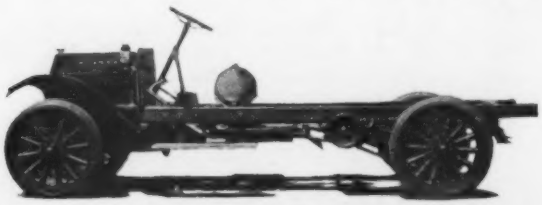
BESSEMER MODEL C, 2000-LB. COVERED FLARE BOARD.

1500 Pound Gasoline

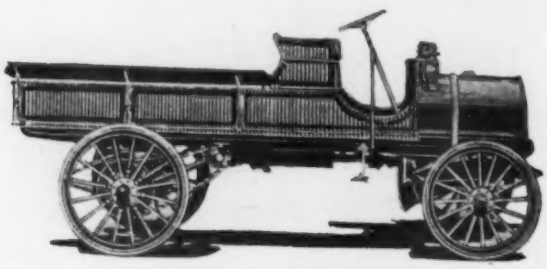
Model	Chassis Weight	Chassis Price	Dimensions of Carrying Space	Height Load P'f'm	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	Cooling	Radiator
Chase Motor Truck Co., Syracuse, N. Y.												
D	....	855	81x46	34	18	*34	3	4.12	4	S	A	..
White Company, Cleveland, O.												
GBBE	2852	2100	.....	31	..	23	4	3.75	5.12	B	G	H
Stewart Motor Corp., Buffalo, N. Y.												
....	2520	1500	.....	30	30	23	4	3.75	5.25	B	W	H
Willet Engine & Truck Co., Buffalo, N. Y.												
M	3250	1650	88x48	36	25	23	4	3.75	5.25	B	C	T

2000 Pound Gasoline

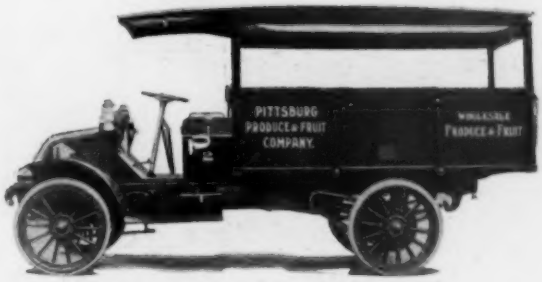
Auglaize Motor Car Co., New Bremen, O.												
G	2600	1550	.....	30	15	23	4	3.75	5.25	B	W	V
O. Armleder Co., Cincinnati, O.												
B	3900	2200	.....	40	20	27	4	4.12	5.25	B	C	T
Adams Bros. Co., Findlay, O.												
A	3320	1850	60x132	39	15	23	4	3.75	5.25	B	C	T
Brockway Motor Truck Co., Cortland, N. Y.												
H	3100	1640	86x46	36	12	23	4	3.75	5.25	B	C	C
C. L. Barker, Norwalk, Conn.												
U	3950	2000	132x44	36	25	26	4	4	5	B	T	C
Bessemer Motor Truck Co., Grove City, Pa.												
C	....	....	.....	..	15	20	4	3.5	5	B	T	C
Croce Auto Works, Asbury Park, N. J.												
A	2300	1700	.....	27	25	23	4	3.75	5	B	W	..
Maccarr Co., Allentown, Pa.												
B	4100	1900	.....	34	20	23	4	3.75	5.25	B	C	V



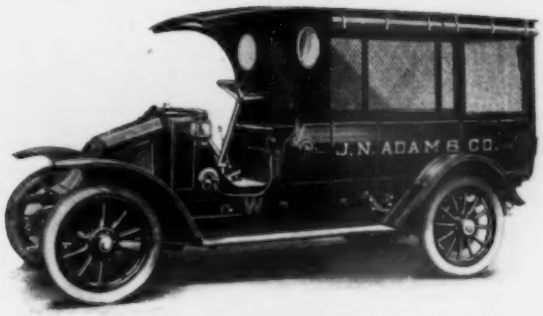
MACCARR MODEL B, 2000-LB. CHASSIS, $1900.



CHASE MODEL D, 1500-LB. FLARE BOARD, $900.
Carrying space, 81x46.



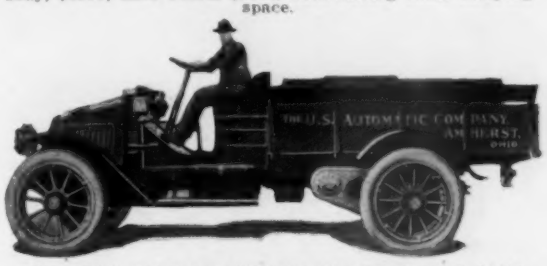
ADAMS MODEL A, 2000-LB. COVERED FLARE BOARD, $1932.50 TO $1992.50.
Load platform, 44x108 to 60x132. Also stake platform, $1938.50 to $1970; load platform, 46x108 to 66x137.



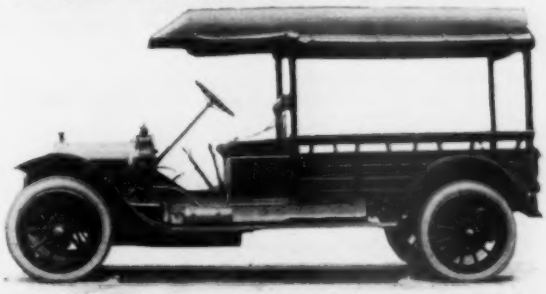
WILLET MODEL M, SCREEN SIDE BODY, $1850.
Carrying space, 88x48. This chassis also supplied with panel body, $1800; flare board, $1775, both having same carrying space.

Commercial Cars

	Carburetor	Ignition	Spark Plug Size	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering & Control	Wheelbase	% Weight on Rear Wheels	Engine Starter
Chase Motor Truck Co., Syracuse, N. Y.												
H	B		½	C	L	2	36x2½	36x2½	R	106	60	..
White Company, Cleveland, O.												
SP	B		..	B	S	4	*	*	L	134	..	..
Stewart Motor Corp., Buffalo, N. Y.												
MY	B		S	B	S	3	*34x4½	*34x4½	L	126	70	..
Willet Engine & Truck Co., Buffalo, N. Y.												
Z	E		½	C	S	3	*34x4½	*34x4½	L	125	60	..



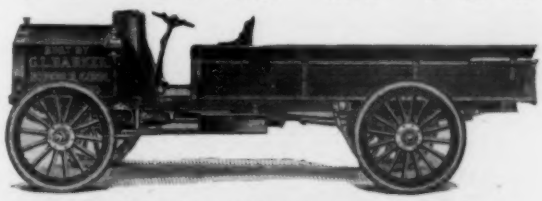
SANDUSKY MODEL B, 1500-LB. FLARE BOARD, $1400.



WHITE MODEL G-B-B-E, 1500-LB. COVERED FLARE BOARD, $2250.

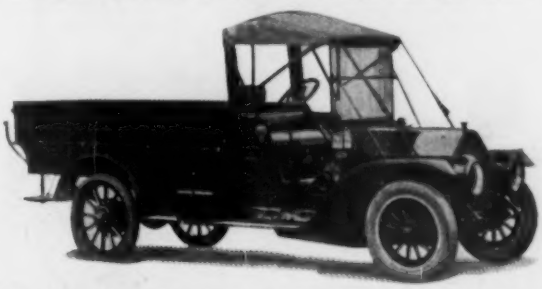
Commercial Cars

Auglaize Motor Car Co., New Bremen, O.												
SL	R		½	IG	S	3	.....	.....	L	110	70	..
O. Armleder Co., Cincinnati, O.												
SL	B		½	B	S	3	*40x4	*40x5	L	136	70	..
Adams Bros. Co., Findlay, O.												
SB	B		S	W	S	3	36x3½	36x4	L	128	70	..
Brockway Motor Truck Co., Cortland, N. Y.												
H	B		S	C	S	3	36x3	36x3½	L	106	70	..
C. L. Barker, Norwalk, Conn.												
SB	E		S	W	S	4	42x3½	42x5	L	130	80	..
Bessemer Motor Truck Co., Grove City, Pa.												
R	E		½	C	S	3	34x3	34x3½	C	108	65	..
Croce Auto Works, Asbury Park, N. J.												
SL	B		S	B	S	3	34x4¼	34x4¼	R	100	50	..
Maccarr Co., Allentown, Pa.												
SB	B		S	C	S	3	.....	.....	L	132	66	..



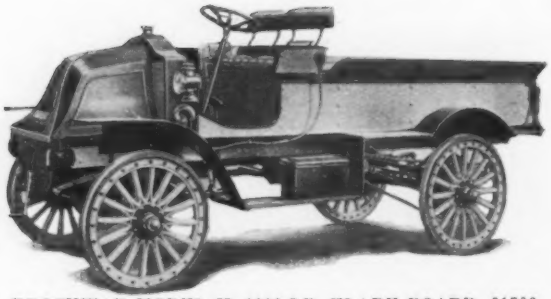
BARKER MODEL U, 2000-LB. FLARE BOARD, $2075.

CROCE MODEL A, 2000-LB. PANEL BODY, $1850.
This chassis also supplied with flare board body, $1850.



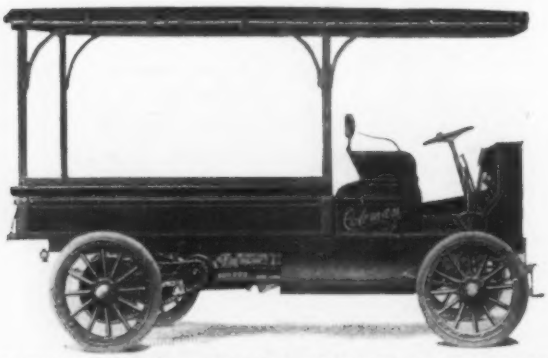
AUGLAIZE MODEL G, 2000-LB. FLARE BOARD, $1400 & $1600.
This chassis also supplied with panel body, $1600 and $1800; stake body, $1400 and $1600.

ARMLEDER MODEL B, 2000-LB. SCREEN SIDE EXPRESS, CHASSIS, $2200.



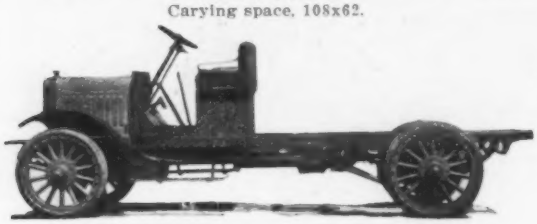
BROCKWAY MODEL H, 2000-LB. FLARE BOARD, $1700.
Carrying space, 86x46. This chassis also supplied with panel body, carrying space, 84x45, $1850; stake body, 96x44, $1750.

MODERN MODEL G, 2000-LB. PANEL BODY, CHASSIS, $1700.
Made by Bowling Green Motor Car Co.

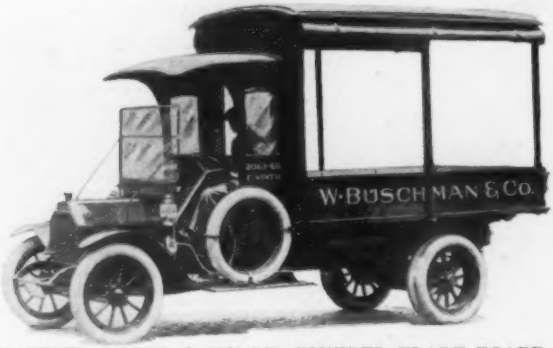


COLEMAN MODEL B, 2000-LB. COVERED FLARE BOARD, CHASSIS, $1950.

BESSEMER MODEL B, 2000-LB. COVERED FLARE BOARD, CHASSIS, $1800.
Carying space, 108x62.



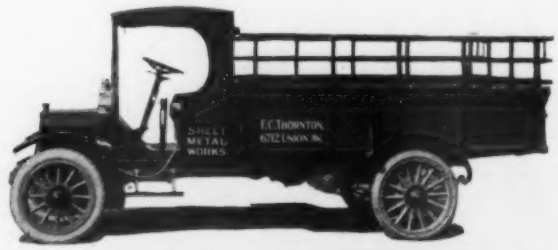
B. A. GRAMM'S 2000-LB. CHASSIS, $2000.
This chassis supplied with panel body, carrying space, 114x42.



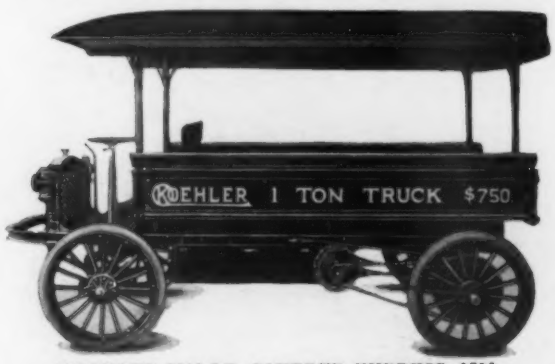
GABRIEL MODEL J, 2000-LB. COVERED FLARE BOARD, $2150.
This chassis also supplied with panel body, $2250; stake body, $2200.

2000 Pound Gasoline

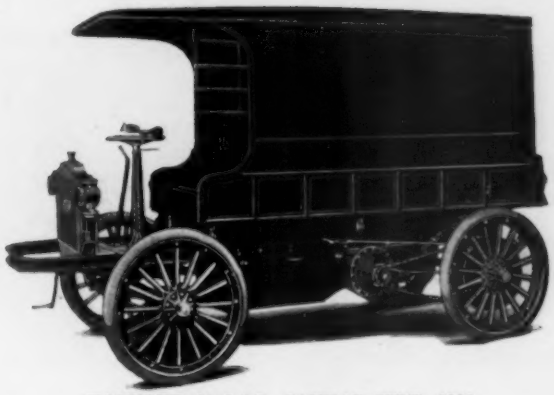
Model	Chassis Weight	Chassis Price	Dimensions of Carrying Space	Height Load F'l'm	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	Cooling	Radiator
F. Coleman C. & H. Co., Ilion, N. Y.												
B	3300	1950	102x46	..	17	23	4	3.75	5.25	B	C	H
Bowling Green Motor Car Co., Bowling Green, O.												
G	2800	1700	.....	31	18	23	4	3.75	5.25	B	C	H
Gabriel Auto Co., Cleveland, O.												
J	3600	2000	.....	35	20	27	4	4.12	5.25	B	C	H
Gramm-Bernstein Co., Lima, O.												
1	3500	2000	114x44	33	16	23	4	3.75	5.25	B	C	C
Knox Automobile Co., Springfield, Mass.												
R-3	4350	3000	121x60	36	18	40	4	5	5.5	S	C	C
Krebs Commercial Car Co., Clyde, O.												
AA	2650	1425	46x82	24	15	23	4	3.75	4.5	B	T	T
H. J. Koehler S. G. Co., New York City.												
....	2000	725	96x44	38	20	22	2	5.25	4	S	T	T
International Motor Co., New York City.												
Mack	4085	2000	.....	35	19	32	4	4.5	5.5	P	C	C
Mora Power Wagon Co., Cleveland, O.												
24	....	1400	.....	38	15	18	4	3.37	5	B	C	C
25	....	1500	.....	38	15	18	4	3.37	5	B	C	C



MORA MODEL 25, 2000-LB. FLARE BOARD WITH SLAT EXTENSION, CHASSIS, $1500.



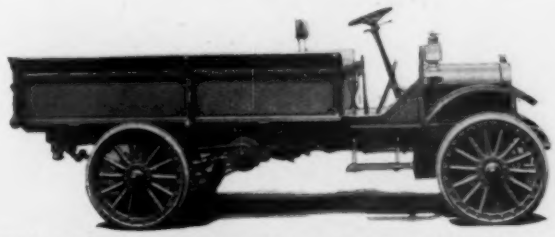
KOEHLER 2000-LB. COVERED EXPRESS, $790.
This chassis also supplied with flare board body, $750; stake body, $775; bakers' body, $925.



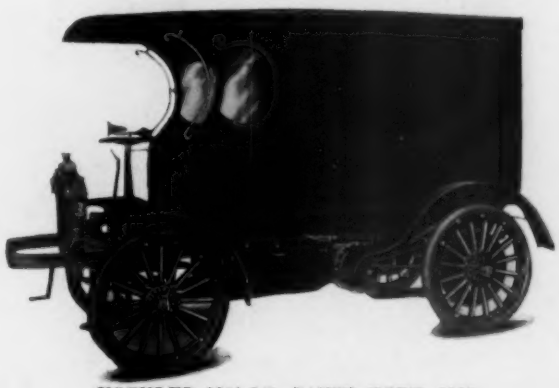
KOEHLER 2000-LB. CANVAS SIDE, $800.

Commercial Cars

Carburetor	Ignition	Spark Plug Size	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering & Control	Wheelbase	% Weight on Rear Wheels	Engine Starter
F. Coleman C. & H. Co., Ilion, N. Y.											
SL	R	S	C	S	3	36x3½	36x4	R	107	80	..
Bowling Green Motor Car Co., Bowling Green, O.											
SL	B	S	C	S	3	36x3½	36x4	L	136	..	..
Gabriel Auto Co., Cleveland, O.											
SB	B	S	B	S	4	*	*D	L	144	60	..
Gramm-Bernstein Co., Lima, O.											
SL	B	..	C	IC	3	.....	.....	L	130	74	E
Knox Automobile Co., Springfield, Mass.											
SB	B	S	C	S	3	34x4	34x4D	R	145	80	..
Krebs Commercial Car Co., Clyde, O.											
SL	B	S	C	S	3	34x3	34x3	L	100	63	..
H. J. Koehler S. G. Co., New York City.											
SL	B	S	C	L	2	36x2½	36x2½	L	90	60	..
International Motor Co., New York City.											
SC	B	S	C	S	3	36x4	36x2½D	L	126	48	..
Mora Power Wagon Co., Cleveland, O.											
SB	SD	½	C	S,L	3,2	36x2½	36x3	L	115	..	..
SB	SD	½	C	S,L	3,2	36x2½	36x3	L	135	..	..

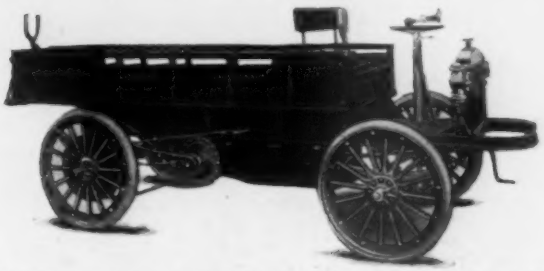


MORA MODEL 24, 2000-LB. FLARE BOARD, CHASSIS, $1400.

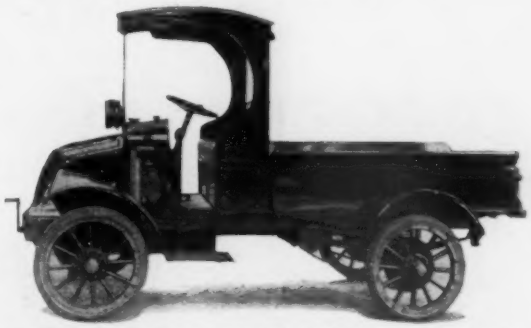


KOEHLER 2000-LB. PANEL BODY, $900.

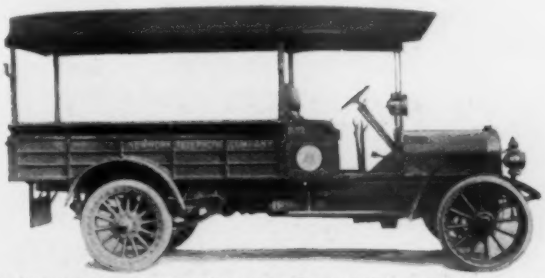
KOEHLER 2000-LB. OPEN BODY, $825.
Carrying space, 108x50.



KOEHLER 2000-LB. PLUMBERS' AND CONTRACTORS' BODY, $800.
Body, 96 long.

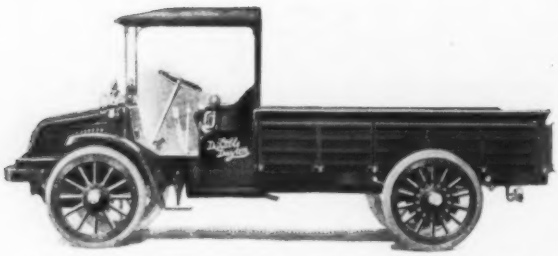


KREBS MODEL AA, 2000-LB. FLARE BOARD, $1525.
Carrying space, 82x46. This chassis also supplied with panel body, 80x46; screen side, 82x46x55, $1600.

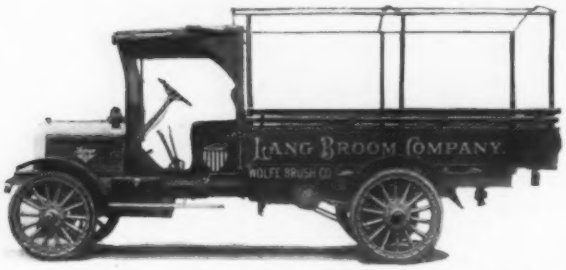


MACK 2000-LB. COVERED FLARE BOARD, CHASSIS, $2000.
Made by International Motor Co.

KNOX MODEL R-3, 2000-LB. FLARE BOARD, $3275.
Carrying space, 132x60. This chassis also supplied with panel body, same carrying space, $3450; stake body, same carrying space, $7235.



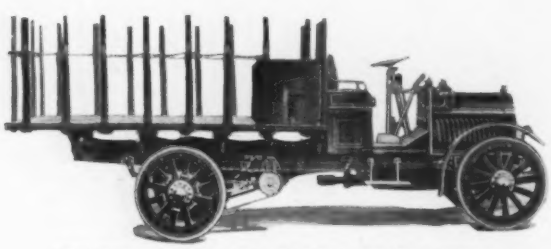
DAYTON MODEL U, 2000-LB. FLARE BOARD, $1475.



LANGE MODEL C, 2000-LB. FLARE BOARD, CHASSIS, $2250.

STANDARD MODEL A, 2000-LB. FLARE BOARD WITH SLAT SIDES, CHASSIS, $1700.
Made by the Standard Motor Truck Co., Warren, O.

ROWE MODEL B, 2000-LB. COVERED EXPRESS, $2175.



SELDEN MODEL J-L, 2000-LB. STAKE BODY.

STEWART MODEL G, 2000-LB. PANEL BODY, $1425.
Made by the Stewart Iron Works Co.

2000 Pound Gasoline

Model	Chassis Weight	Chassis Price	Dimensions of Carrying Space	Height Load P'f'm	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	Cooling	Radiator
Rowe Motor Mfg. Co., Downingtown, Pa.												
B	....	2000	.....	..	18	29	4	4.25	5	P	C	..
Lauth-Juergens Motor Car Co., Fremont, O.												
K	3500	2100	132x46x36	..	15	23	4	3.75	5.25	B	C	C
Lord Baltimore Truck Co., Baltimore, Md.												
B	....	1800	.....	..	18	23	4	3.75	5.25	B	G	H
Lange Motor Truck Co., Pittsburgh, Pa.												
C	4200	2250	.....	40	18	23	4	3.75	5.25	B	T	H
Palmer-Moore Co., Syracuse, N. Y.												
C	2200	1200	.....	34	18	*32	3	4	4	S	A	..
D	2200	1350	.....	34	18	*32	3	4	4	S	T	T
Sanford Motor Truck Co., Syracuse, N. Y.												
K	3100	1660	96x45	36	16	26	4	4	4.5	S	C	H
Stewart Iron Works Co., Cincinnati, O.												
....	2250	1110	.....	34	18	20	2	5	5.5	S	C	T
Sullivan Motor Car Co., Rochester, N. Y.												
51	2100	1050	.....	34	18	16	2	4.5	4.5	S	T	V
Standard Motor Truck Co., Warren, O.												
A	2500	1700	.....	37	20	26	4	4	4.5	P	C	H
Selden Motor Vehicle Co., Rochester, N. Y.												
J	4300	....	.....	30	15	23	4	3.75	5.25	B	C	T
JL	4380	....	.....	30	15	23	4	3.75	5.25	B	C	T

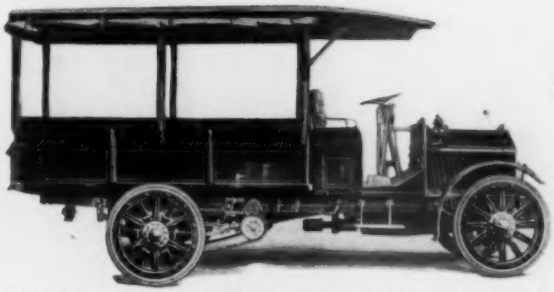
LAUTH-JUERGENS MODEL K, 2000-LB. SCREEN SIDE EXPRESS, CHASSIS, $2100.
This chassis also supplied with stake body, 132x46, $2250.

LORD BALTIMORE MODEL B, 2000-LB. SCREEN SIDE BODY, $2000.

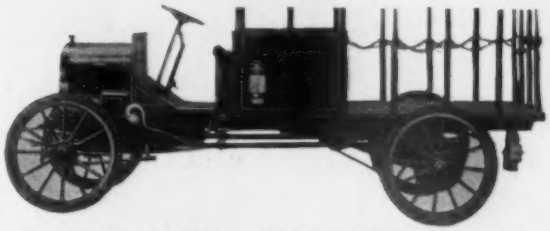
Commercial Cars

Carburetor	Ignition	Spark Plug Size	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering & Control	Wheelbase	% Weight on Rear Wheels	Engine Starter
Rowe Motor Mfg. Co., Downingtown, Pa.											
..	..	..	..	..	3	.....	.....	R	122	..	..
Lauth-Juergens Motor Car Co., Fremont, O.											
O	E	S	C	S	3	36x3½	36x4	R	110	..	..
Lord Baltimore Truck Co., Baltimore, Md.											
SL	E	S	IG	S	3	34x3	36x4	L	128	65	..
Lange Motor Truck Co., Pittsburgh, Pa.											
SB	C	S	C	S	3	36x3½	38x4	L	125	80	..
Palmer-Moore Co., Syracuse, N. Y.											
SP	B	½	C	L	2	2½	3	R	102	65	..
SP	B	½	C	S	3	2½	3	R	102	65	..
Sanford Motor Truck Co., Syracuse, N. Y.											
SL	R	S	C	S	3	36x3½	36x3½	R	106	55	..
Stewart Iron Works Co., Cincinnati, O.											
SL	K	½	F	L	2	36x3	36x3	L	96	60	..
Sullivan Motor Car Co., Rochester, N. Y.											
SL	B	½	C	L	2	36x2½	36x3	L	120	60	..
Standard Motor Truck Co., Warren, O.											
D	B	S	C	S	3	36x4	36x3½	R	124	75	..
Selden Motor Vehicle Co., Rochester, N. Y.											
SB	B	S	C	S	3	36x3½	36x4	L	125	72	..
SB	B	S	C	S	3	36x3½	36x4	L	145	75	..

WHITE STAR 2000-LB. COVERED FLARE BOARD, $1900.



SELDEN MODEL J, 2000-LB. COVERED FLARE BOARD, CHASSIS, $2000.



SULLIVAN MODEL 51, 2000-LB. STAKE BODY, $1150.
This chassis also supplied with flare board body, $1140.

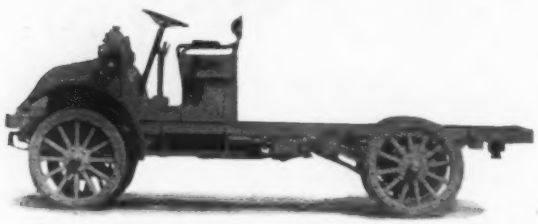
STEWART MODEL C, 2000-LB. FLARE BOARD, $1150.
Made by the Stewart Iron Works Co.

STEWART MODEL D, 2000-LB. STAKE BODY, $1150.
Made by the Stewart Iron Works Co.

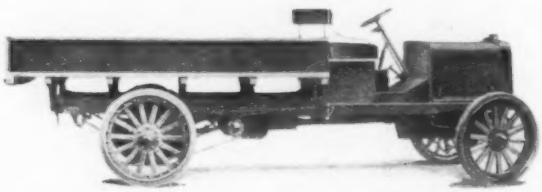
STEWART MODEL E, 2000-LB. SCREEN SIDE, $1250.
Made by the Stewart Iron Works Co.

TIFFIN MODEL G, 2000-LB. COVERED FLARE BOARD. CHASSIS, $2000.

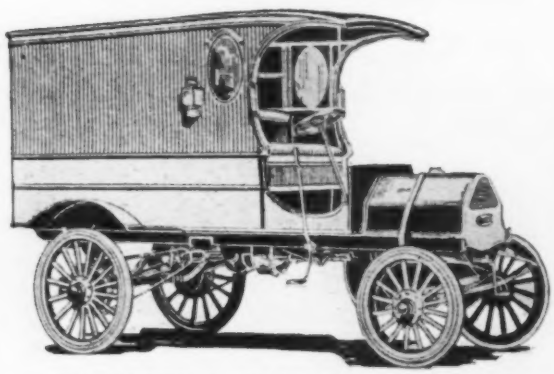
TRABOLD 2000-LB. PANEL BODY, CHASSIS, $1475. Carrying space, 108x44.



KELLY MODEL K-30, 2000-LB. CHASSIS, $2000.



CORBITT MODEL F, 2500-LB. FLARE BOARD, $2075. This chassis also supplied with stake body, $2085.



CHASE MODEL H, 2500-LB. PANEL BODY, $1200. This chassis also furnished with express body, 81x46, $1250.

AUTOCAR MODEL XXI-F, 3000-LB. COVERED FLARE BOARD. CHASSIS, $1850.

2000 Pound Gasoline

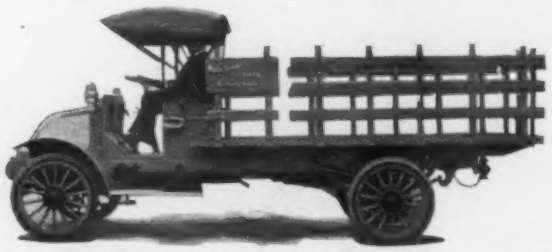
Model	Chassis Weight	Chassis Price	Dimensions of Carrying Space	Height Load Plfm	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	Cooling	Radiator
Atterbury Motor Car Co., Buffalo, N. Y.												
B	3600	....	.....	40	17	23	4	3.75	5.25	B	W	T
Kelly-Springfield Motor Truck Co., Springfield, O.												
K-30	3800	....	.....	36	15	23	4	3.75	5.25	B	C	V
Martin Carriage Works, York, Pa.												
R	4000	....	.....	36	18	26	4	4	5	B	C	T
Witt-Will Co., Washington, D. C.												
E-14	3400	....	.....	..	18	23	4	3.75	5.25	B	C	T
Tiffin Wagon Co., Tiffin, O.												
G	3100	2000	.....	43	15	23	4	3.75	5.25	B	C	V
Interboro Motor Truck Co., Philadelphia, Pa.												
A	2800	1850	.....	40	20	23	4	3.75	5.25	B	C	T
F. A. Casey Co., Billerica, Mass.												
....	3100	1650	96x48	30	20	27	4	4.12	5.25	B	C	H
Plymouth Motor Truck Co., Plymouth, O.												
D-3	1850	*1850	.....	36	25	26	4	4	4	P	C	H
Trabold Truck Mfg. Co., Johnstown, Pa.												
....	2950	1475	108x44	38	30	23	4	3.75	5.5	B	G	H
Dayton Auto Truck Co., Dayton, O.												
D	....	....	.....	..	10	29	4	4.25	5	P	C	H

2500 Pound Gasoline

Corbitt Automobile Co., Henderson, N. C.												
F	3500	2000	.....	31	18	23	4	3.75	5.25	P	G	C
Chase Motor Truck Co., Syracuse, N. Y.												
H	....	1200	81x46	34	18	*34	3	4.12	4	S	A	..

3000 Pound Gasoline

Lippard-Stewart Motor Car Co., Buffalo, N. Y.												
F	3600	2300	.....	30	15	28	4	4.12	5.25	B	C	T
F	3600	2300	.....	30	15	28	4	4.12	5.25	B	C	T
Autocar Co., Ardmore, Pa.												
XXI-F	2397	1850	.....	34	25	18	2	4.75	4.5	S	C	T
Atterbury Motor Car Co., Buffalo, N. Y.												
R	3800	....	.....	45	15	27	4	4.12	5.25	B	W	T
Adams Bros. Co., Findlay, O.												
D	2740	2300	60x132	39	14	27	4	4.12	5.25	B	C	T



ADAMS MODEL D, 3000-LB. STAKE BODY, $2388.50 TO $2420. Carrying space, 108x46 to 137x66. This chassis also supplied with flare board body, $2382.50 to $2442.50; carrying space, 108x44 to 132x60.

AUTOCAR MODEL XXI-F, 3000-LB. PANEL BODY, CHASSIS, $1850.

WITT-WILL MODEL E 14, 2000-LB. CANVAS SIDE BODY.

Commercial Cars

Carburetor	Ignition	Spark Plug Size	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering & Control	Wheelbase	% Weight on Rear Wheels	Engine Starter
Atterbury Motor Car Co., Buffalo, N. Y.											
Z	E	S	C	S	3	36x3½	36x4	L	136	75	..
Kelly-Springfield Motor Truck Co., Springfield, O.											
B	E	S	C	S	3	36x3½	36x4	L	120	75	..
Martin Carriage Works, York, Pa.											
..	..	S	C	S	3	36x3½	36x4	R	125	70	..
Witt-Will Co., Washington, D. C.											
SL	E	S	C	S	3	36x3½	40x4	R	110	60	..
Tiffin Wagon Co., Tiffin, O.											
SL	B	S	..	S	3	.....	.....	L	128	60	..
Interboro Motor Truck Co., Philadelphia, Pa.											
SB	S	S	IG	S	3	.....	.....	L	124	70	..
F. A. Casey Co., Billerica, Mass.											
SB	B	S	W	S	3	*34x4½	*34x4½D	O	108	75	E
Flymouth Motor Truck Co., Flymouth, O.											
SL	SD	S	F	F	10	34x3	36x3½	L	125	..	..
Trabold Truck Mfg. Co., Johnstown, Pa.											
SB	BR	M	C	S	3	36x3	38x3½	..	128	70	..
Dayton Auto Truck Co., Dayton, O.											
SB	B	S	C	S	3	.....	.....	L	119	..	..

Commercial Cars

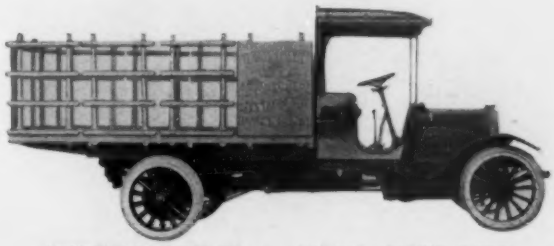
Corbitt Automobile Co., Henderson, N. C.											
SB	B	S	C	S	3	36x3½	40x4	L	130	65	..
Chase Motor Truck Co., Syracuse, N. Y.											
H	B	S	C	L	2	36x3	36x3	R	106	60	..

Commercial Cars

Lippard-Stewart Motor Car Co., Buffalo, N. Y.											
R	E	..	W	S	3	36x3½	36x3D	L	145	70	..
R	E	..	W	S	3	36x3½	36x3D	L	158	70	..
Autocar Co., Ardmore, Pa.											
SB	B	S	B	P	3	.....	.....	R	97	80	..
Atterbury Motor Car Co., Buffalo, N. Y.											
SB	B	S	W	S	3	36x3½	36x5	C	145	70	..
Adams Bros. Co., Findlay, O.											
Z	E	S	C	S	3	36x3½	36x3½D	L	136	75	..

WITT-WILL MODEL E 14, 2000-LB. FLARE BOARD.

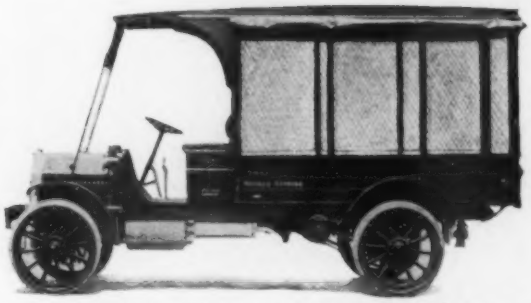
INTERBORO MODEL A, 2000-LB. COVERED FLARE BOARD, CHASSIS, $1850.



ATTERBURY MODEL R, 3000-LB. STAKE BODY.

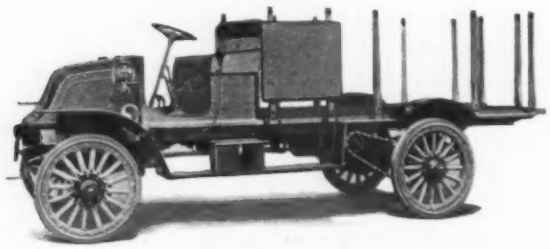
LIPPARD-STEWART MODEL F, 3000-LB. PANEL BODY, CHASSIS, $2300.

NEW YORK MODEL L, 3000-LB. FLARE BOARD CHASSIS, $2100.
Made by Tegetmeier & Riepe Co.

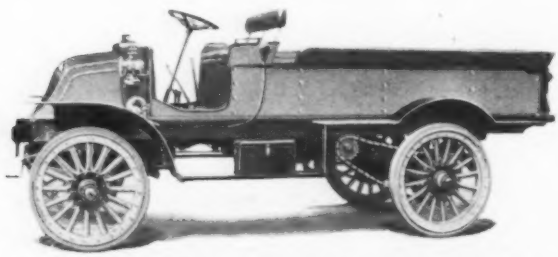


NEW YORK MODEL L, 3000-LB. SCREEN SIDE CHASSIS, $2100.
Made by Tegetmeier & Riepe Co.

BLAIR MODEL C, 3000-LB. SIDED PLATFORM BODY, $3000.
Carrying space, 126 to 138x56. This chassis also supplied with panel body, $3000, same carrying space; flare board body, same carrying space, $3010.



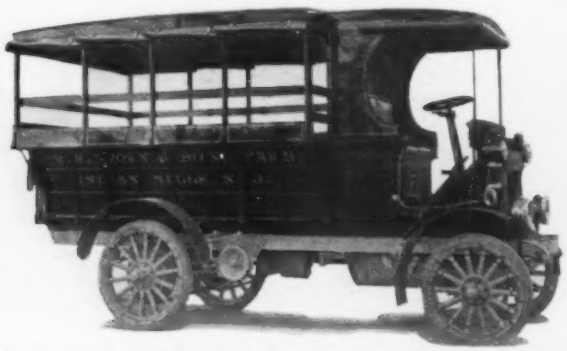
BROCKWAY MODEL D, 3000-LB. STAKE BODY, CHASSIS, $1875.



BROCKWAY MODEL I, 3000-LB. FLARE BOARD, $1950.
Carrying space, 98x50. This chassis also supplied with panel body, 96x49, $2150; stake body, 110x48, $2000.

3000 Pound Gasoline

Model	Chassis Weight	Chassis Price	Dimensions of Carrying Space	Height Load P'f'm	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	Cooling	Radiator
Chase Motor Truck Co., Syracuse, N. Y.												
L	....	....	108x46	32	15	*40	3	4.5	5	S	A	..
Mansur Motor Truck Co., Haverhill, Mass.												
....	2800	2300	114x48	36	15	26	4	4	4.5	P	C	C
Rowe Motor Mfg. Co., Downingtown, Pa.												
C	....	2400	.....	..	17	29	4	4.25	5	P	C	..
Martin Carriage Works, York, Pa.												
S	4300	....	.....	38	15	26	4	4	5	B	C	T
Middleboro Auto Exchange, Middleboro, Mass.												
F	4200	*2250	108x44	36	30	32	4	4.5	5	B	C	C
Brockway Motor Truck Co., Cortland, N. Y.												
D	3600	1875	98x50	36	10	*40	3	4.5	5	S	A	..
I	3700	1875	98x50	36	10	27	4	4.12	5.25	B	C	C
Bowling Green Motor Car Co., Bowling Green, O.												
H	3000	1950	.....	31	15	27	4	4.12	5.25	B	C	H
Gabriel Auto Co., Cleveland, O.												
L	4200	2500	.....	35	20	27	4	4.12	5.25	B	C	H
Krebs Commercial Car Co., Clyde, O.												
DD	3800	1775	48x115	39	15	23	4	3.75	5.25	B	T	T
Maccarr Co., Allentown, Pa.												
C	4500	2150	.....	34	15	27	4	4.12	5.25	B	C	V
Sanford Motor Truck Co., Syracuse, N. Y.												
L	3450	1910	108x45	36	14	26	4	4	4.5	P	C	H
Tegetmeier & Riepe Co., New York City.												
L	3750	2100	.....	33	18	23	4	3.75	5.25	B	C	H
Standard Motor Truck Co., Warren, O.												
B	2900	1800	.....	38	18	26	4	4	4.5	P	C	H
C	3100	2000	.....	38	18	26	4	4	4.5	P	C	H
O. Armleder Co., Cincinnati, O.												
H	4100	2150	.....	42	15	32	4	4.5	5	B	C	T
Blair Mfg. Co., Newark, O.												
C	4250	2850	48x138	34	14	27	4	4.12	5.25	B	C	H



MARTIN MODEL S, 3000-LB. COVERED EXPRESS.

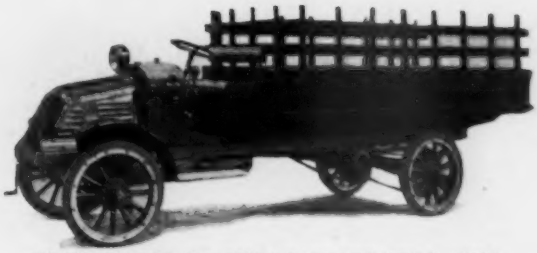
MANSUR 3000-LB. FLARE BOARD, $2400.

ARMLEDER MODEL H, 3000-LB. ENCLOSED EXPRESS, CHASSIS, $2150.
This chassis also supplied with panel body, $2450; stake platform body, $2350; flare board body, $2375.

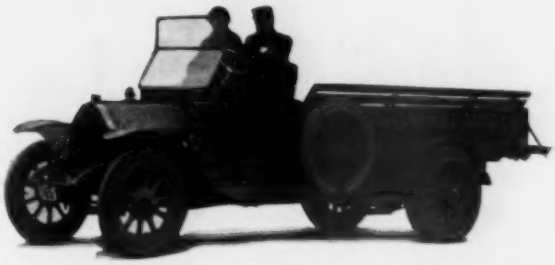
Commercial Cars

Carburetor	Ignition	Spark Plug Size	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering & Control	Wheelbase	% Weight on Rear Wheels	Engine Starter
Chase Motor Truck Co., Syracuse, N. Y.											
H	B	S	C	S	3	36x3	36x4	R	146	65	..
Mansur Motor Truck Co., Haverhill, Mass.											
Z	E	S	W	S	3	36x4C	36x6C	R	124	60	..
Rowe Motor Mfg. Co., Downingtown, Pa.											
..	..	..	..	..	3	.....	D	R	136	..	..
Martin Carriage Works, York, Pa.											
..	..	S	C	S	3	36x3½	40x4	R	121	60	..
Middleboro Auto Exchange, Middleboro, Mass.											
SL	B	½	C	S	3	*34x5	*38x5½	L	130	65	..
Brockway Motor Truck Co., Cortland, N. Y.											
H	B	S	C	S	3	36x3½	36x5	L	112	70	..
H	B	S	C	S	3	36x3½	36x5	L	112	70	..
Bowling Green Motor Car Co., Bowling Green, O.											
SL	B	S	C	S	3	36x3½	36x5	L	136	..	..
Gabriel Auto Co., Cleveland, O.											
SB	B	S	B	S	4	*	*D	L	156	60	..
Krebs Commercial Car Co., Clyde, O.											
SL	B	S	C	S	3	36x3½	36x4	L	144	63	..
Maccarr Co., Allentown, Pa.											
SB	B	S	C	S	3	.....	.....	L	138	66	..
Sanford Motor Truck Co., Syracuse, N. Y.											
SL	R	S	C	S	3	36x3½	36x4	R	118	55	..
Tegetmeier & Riepe Co., New York City.											
SB	B	½	C	S	3	36x3½	36x5	R	129	60	..
Standard Motor Truck Co., Warren, O.											
D	B	S	C	S	3	36x4	36x4	R	134	75	..
D	B	S	C	S	3	36x4	36x5	R	134	75	..
O. Armleder Co., Cincinnati, O.											
SL	B	S	C	S	3	40x4	40x3D	L	136	70	..
Blair Mfg. Co., Newark, O.											
SI	S	S	W	S	3	34x4	34x3D	R	114	71	..

SANDUSKY MODEL C, 3000-LB. FLARE BOARD, $2000.



KREBS MODEL DD, 3000-LB. STAKE BODY, $1975.
Carrying space, 132x66. This chassis also supplied with flare board body, 115x48, $1800; screen side, 115x62x48, $2000.



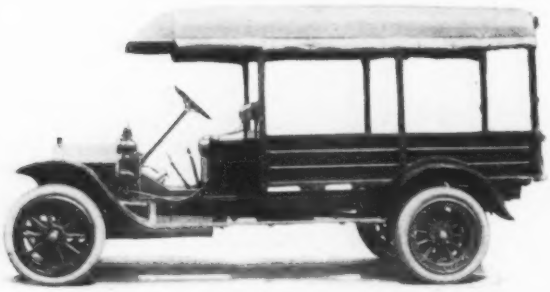
GABRIEL MODEL L, 3000-LB. FLARE BOARD, $2650.
This chassis also supplied with panel body, $2750; stake body, $2700.

MACCARR MODEL C, 3000-LB. SCREEN SIDE COVERED EXPRESS, CHASSIS, $2150.

ROWE MODEL C, 3000-LB. OPEN EXPRESS, $2725.

STANDARD MODEL B, 3000-LB. COVERED FLARE BOARD, CHASSIS, $1800.
Made by the Standard Motor Truck Co., Warren, O.

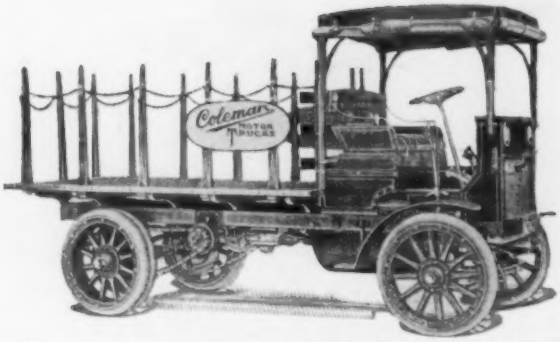
TRABOLD 3000-LB. FLARE BOARD, CHASSIS, $1800.
Carrying space, 114x48.



WHITE MODEL T-B-C, 3000-LB. COVERED FLARE BOARD, $3150.
This chassis also supplied with platform body, $3150.

STARBUCK 3000-LB. FLARE BOARD EXPRESS, $1800.

ADAMS MODEL F, 4000-LB. DUMPING BODY.



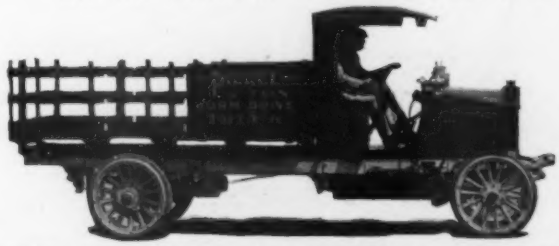
COLEMAN MODEL C, 4000-LB. STAKE BODY, CHASSIS, $2400.

3000 Pound Gasoline

Model	Chassis Weight	Chassis Price	Dimensions of Carrying Space	Height Load P'f'm	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	Cooling	Radiator
			Hahn Motor Truck & Wagon Co., Hamburg, Pa.									
....	4000	2400	.....	32	15	27	4	4.12	5.25	B	C	T
			Starbuck Auto Co., Philadelphia, Pa.									
B	3000	*1800	108x44	..	15	32	4	4.5	4.5	P	W	H
			White Company, Cleveland, O.									
TBC	3810	3000	.....	34	..	23	4	3.75	5.12	B	G	H
			Trabold Truck Mfg. Co., Johnstown, Pa.									
....	3900	1800	114x44	38	30	27	4	4.12	5.5	B	G	H
			Sandusky Auto Parts & Motor Truck Co., Sandusky, O.									
C	3360	2500	114x48	36	15	23	4	3.75	5	B	C	T

4000 Pound Gasoline

			Transit Motor Truck Co., Louisville, Ky.									
F	4300	2850	168x60	..	14	..	4	....	....	..	C	H
			F. Coleman C. & H. Co., Ilion, N. Y.									
C	4200	2400	126x65	..	14	29	4	4.25	5.25	S	C	H
			Adams Bros. Co., Findlay, O.									
E	4120	2500	60x132	40	11	27	4	4.12	5.25	B	C	T
			Pierce-Arrow Motor Car Co., Buffalo, N. Y.									
X-2	....	3000	.....	..	16	26	4	4	5	B	C	T
			Driggs-Seabury Ordnance Corp., Sharon, Pa.									
....	5540	*2750	.....	37	13	29	4	4.33	5.5	P	T	H
			Lauth-Juergens Motor Car Co., Fremont, O.									
L	5000	2800	172x60x36	..	14	23	4	3.75	5.25	B	C	C
			Bessemer Motor Truck Co., Grove City, Pa.									
....	....	....	.....	..	15	27	4	4.12	5.25	B	T	C
....	....	....	.....	..	15	27	4	4.12	5.25	B	T	C
			Dayton Auto Truck Co., Dayton, O.									
B	....	....	.....	..	10	36	4	4.75	5.5	P	C	H



PIERCE-ARROW MODEL X-2, STAKE BODY, CHASSIS, $3000.

ADAMS MODEL E, 4000-LB. COVERED FLARE BOARD, CHASSIS, $2500.
Flare board, 44x108 to 60x132, $2582.50 to $2642.50; stake body, 46x108 to 66x137, $2588.50 to $2620.

ERIE 3000-LB. STAKE BODY, $2000.
Made by Erie Truck Mfg. Co.

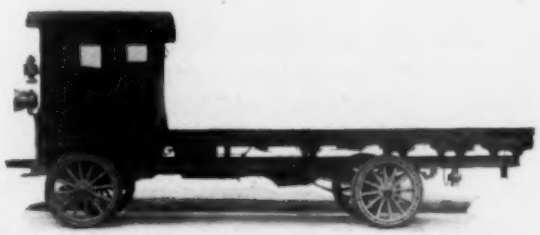
VULCAN 4000-LB. COVERED FLARE BOARD, $2750.
Made by Driggs-Seabury Ordnance Corp.

Commercial Cars

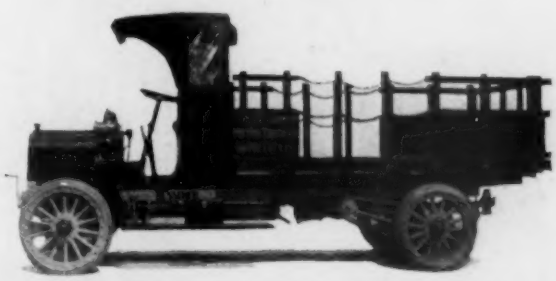
Carburetor	Ignition	Spark Plug Size	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering & Control	Wheelbase	% Weight on Rear Wheels	Engine Starter
Hahn Motor Truck & Wagon Co., Hamburg, Pa.											
SL	B	½	W	S	3	34x3½	36x3½D	R	140	67	..
Starbuck Auto Co., Philadelphia, Pa.											
SL	MI	½	C	S	3	36x3½	40x4	R	110	60	..
White Company, Cleveland, O.											
SP	B	..	B	S	4	*	*	L	146	..	..
Trabold Truck Mfg. Co., Johnstown, Pa.											
SB	BR	M	C	S	3	36x3½	38x4	..	130	70	..
Sandusky Auto Parts & Motor Truck Co., Sandusky, O.											
SL	E	S	C	S	3	40x3½	40x4	L	106	..	..

Commercial Cars

Transit Motor Truck Co., Louisville, Ky.											
..	M	S	C	S	3	.....	D	R	144	66	..
F. Coleman C. & H. Co., Ilion, N. Y.											
SL	R	S	C	S	3	36x4	36x3½D	R	117	82	..
Adams Bros. Co., Findlay, O.											
Z	E	S	C	S	3	36x4	36x4D	L	140	75	..
Pierce-Arrow Motor Car Co., Buffalo, N. Y.											
SP	B	..	W	S	3	36x4	36x4D	R	150	66	..
Driggs-Seabury Ordnance Corp., Sharon, Pa.											
SB	B	S	C	S	3	36x4	34x4D	R	144	70	..
Lauth-Juergens Motor Car Co., Fremont, O.											
O	E	S	C	S	3	36x4	36x5	R	120	..	..
Bessemer Motor Truck Co., Grove City, Pa.											
R	E	½	C	S	3	34x4	34x5	C	136	65	..
R	E	½	W	S	3	36x4	36x3D	C	136	65	..
Dayton Auto Truck Co., Dayton, O.											
SB	B	S	C	S	3	.....	.....	L	119	..	..



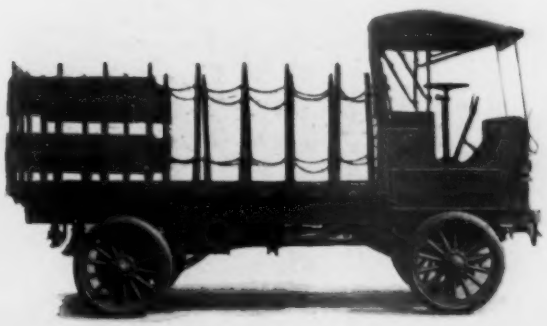
TRANSIT MODEL F, 4000-LB. CHASSIS, $2850.
This chassis supplied with panel body, $3050; stake body, $3025; flare board, $3030. All carrying spaces, 168x60.



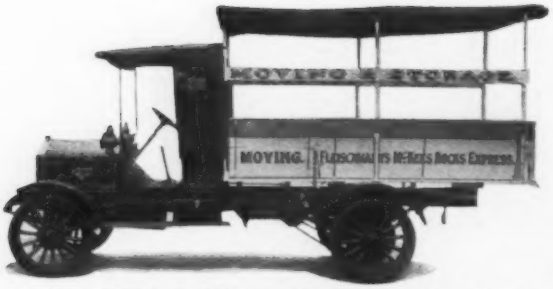
BESSEMER MODEL A, 4000-LB. STAKE BODY.

HAHN 3000-LB. COVERED EXPRESS CHASSIS, $2400.

LAUTH-JUERGENS MODEL L, 4000-LB. FLARE BOARD, CHASSIS, $2800.
This chassis also supplied with stake body, 162x60, $3000.

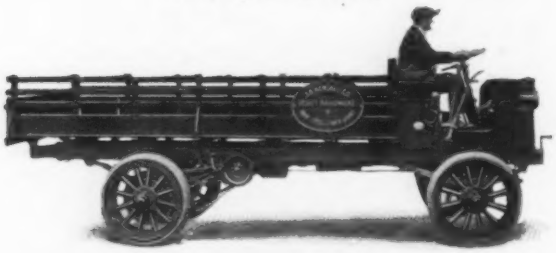


DAYTON 4000-LB. STAKE BODY, $1800.



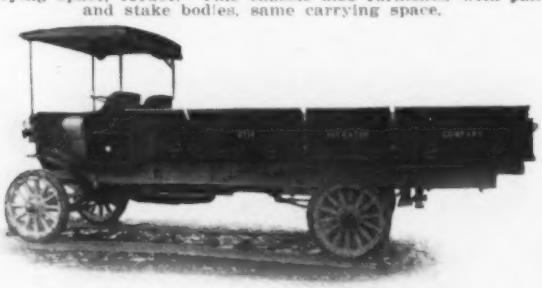
LANGE MODEL B, 4000-LB. COVERED FLARE BOARD, CHASSIS, $3000.

WHITE STAR MODEL D, 4000-LB. COVERED EXPRESS, CHASSIS, $2750.
Carrying space, 144x72.

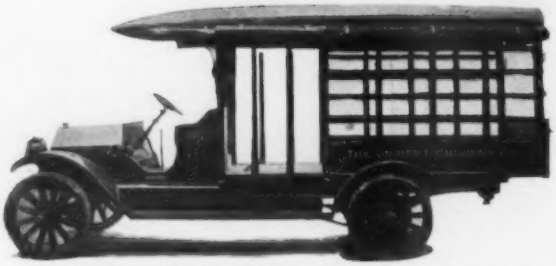


WITT-WILL MODEL P-2, 4000-LB. FLARE BOARD.

SCHACHT 4000-LB. COVERED FLARE BOARD, $2650.
Carrying space, 120x50. This chassis also furnished with panel and stake bodies, same carrying space.



BLAIR MODEL D, 5000-LB. FLARE BOARD, $3410.
Carrying space 138 to 180x56. This chassis also supplied with panel body, same carrying space, $3400; stake body, same carrying space, $3400.



ARMLEDER MODEL E, 5000-LB. COVERED SLAT BODY, CHASSIS, $2500.
This chassis also supplied with panel body, $2825; stake, $2725; flare board, $2775.

4000 Pound Gasoline

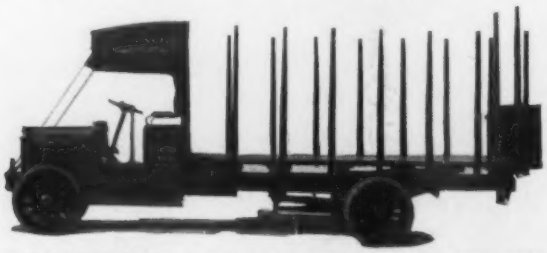
Model	Chassis Weight	Chassis Price	Dimensions of Carrying Space	Height Load F'f'm	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	Cooling	Radiator
			Speedwell Motor Car Co., Dayton, O.									
Y	4900	2850	126x72	41	15	27	4	4.12	5.25	B	C	T
			Atterbury Motor Car Co., Buffalo, N. Y.									
C	4600	....	.....	45	14	29	4	4.25	5.5	B	W	T
			White Star Motor & Eng. Co., Brooklyn, N. Y.									
D	5600	2750	144x72	36	12	29	4	4.25	5.5	P	C	H
			Schleicher Motor Vehicle Co., New York City.									
....	....	3500	....	25	..	4	....	....		P	G	H
			Tiffin Wagon Co., Tiffin, O.									
M	4400	2700	.....	46	12	27	4	4.12	5.25	B	C	V
			Kelly-Springfield Motor Truck Co., Springfield, O.									
K-35	5000	....	.....	36	13	23	4	3.75	5.25	B	C	V
			G. A. Schacht Motor Truck Co., Cincinnati, O.									
....	4700	5650	50x120	38	15	29	4	4.25	5.5	B	C	V
			Gramm-Bernstein Co., Lima, O.									
2	5000	2750	126x48	36	15	32	4	4.5	5.5	P	C	C
			Lord Baltimore Truck Co., Baltimore, Md.									
D	....	2300	....	16	27	4	4.12	5.25		B	G	T
			Lange Motor Truck Co., Pittsburgh, Pa.									
B	4850	3000	.....	41	15	27	4	4.12	5.25	B	T	H
B	4900	3000	.....	43	15	27	4	4.12	5.25	B	T	H
			Croce Auto Works, Asbury Park, N. J.									
B	5300	2800	.....	36	18	29	4	4.25	5	B	W	..
			Witt-Will Co., Washington, D. C.									
P-2-14	6300	....	.....	39	14	27	4	4.12	5.25	B	C	T
			Willet Engine & Truck Co., Buffalo, N. Y.									
L	5900	2800	126x39	48	15	32	4	4.5	5.5	P	C	T
			Rowe Motor Mfg. Co., Downingtown, Pa.									
D	....	2800	....	15	36	4	4.75	5.5		P	C	..
			United States Motor Truck Co., Cincinnati, O.									
E	4800	2800	120x60	43	15	27	4	4.12	5.25	B	C	C
			Plymouth Motor Truck Co., Plymouth, O.									
G-2	2850	*2600	.....	36	15	36	4	4.75	5	P	C	H
			Trabold Truck Mfg. Co., Johnstown, Pa.									
....	5000	2450	144	38	15	29	4	4.25	5.5	B	G	H

5000 Pound Gasoline

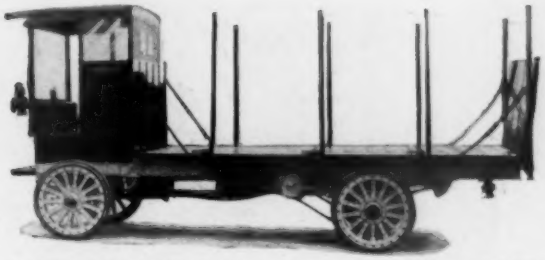
			O. Armleder Co., Cincinnati, O.									
E	4400	2500	.....	42	13	32	4	4.5	5	B	C	T
			Blair Mfg. Co., Newark, O.									
D	5200	3250	138x56	34	12	32	4	4.5	5.5	P	C	H
			Martin Carriage Works, York, Pa.									
E	5400	....	.....	38	14	29	4	4.25	5	P	C	T
			F. A. Casey Co., Billerica, Mass.									
....	6200	2700	132x54	32	16	36	4	4.75	5.5	B	C	H

6000 Pound Gasoline

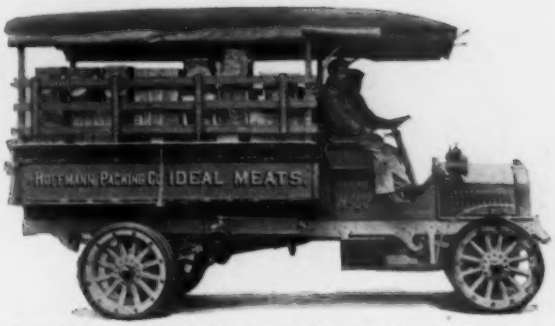
			Hurlburt Motor Truck Co., New York City.									
A	....	3500	....		15	27	4	4.12	5.5	B	C	T
			Lauth-Juergens Motor Car Co., Fremont, O.									
M	6400	3450	....		12	36	4	4.75	5	S	C	C
			Walter Motor Truck Co., New York City.									
....	4100	3400	....	..	..	26	4	4	5	P	G	C



HURLBURT MODEL A, 6000-LB. STAKE BODY, CHASSIS, $3500.



LAUTH-JUERGENS MODEL M, 6000-LB. STAKE BODY, CHASSIS, $3450.



UNITED STATES MODEL E, 4000-LB. COVERED FLARE BOARD, CHASSIS, $2800.
Carrying space, 120x60.

Commercial Cars

Carburetor	Ignition	Spark Plug Size	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering & Control	Wheelbase	% Weight on Rear Wheels	Engine Starter
			Speedwell Motor Car Co., Dayton, O.								
SL	E	S	C	S	3	36x4	36x3½D	L	115	50	..
			Atterbury Motor Car Co., Buffalo, N. Y.								
SB	B	S	W	S	3	36x3½	36x3½D	L	144	70	..
			White Star Motor & Eng. Co., Brooklyn, N. Y.								
SB	E	½	C	S	4	34x4	34x4	R	156	65	..
			Schleicher Motor Vehicle Co., New York City.								
SB	B	S	W	S	3	.....	.....	R	...	70	..
			Tiffin Wagon Co., Tiffin, O.								
SL	B	S	..	S	3	.....	.....	L	140	60	..
			Kelly-Springfield Motor Truck Co., Springfield, O.								
B	E	S	C	S	3	36x4	36	L	144	75	..
			G. A. Schacht Motor Truck Co., Cincinnati, O.								
SL	SD	S	W	S	3	38x3	40x3D	L	138	75	..
			Gramm-Bernstein Co., Lima, O.								
SL	B	..	C	IC	3	.....	D	R	128	70	E
			Lord Baltimore Truck Co., Baltimore, Md.								
SL	E	S	IG	S	3	34x4	36x3D	L	140	70	..
			Lange Motor Truck Co., Pittsburgh, Pa.								
SB	C	S	C	S	3	36x4	38x6	L	136	80	..
SB	C	S	C	S	3	36x4	38x6	L	136	80	..
			Croce Auto Works, Asbury Park, N. J.								
SL	B	S	C	S	3	36x4	36x4D	R	144	50	..
			Witt-Will Co., Washington, D. C.								
SL	E	S	C	S	3	36x4	36x3½D	R	114	60	..
			Willet Engine & Truck Co., Buffalo, N. Y.								
Z	E	½	C	S	3	36x4	36x4D	L	144	60	..
			Rowe Motor Mfg. Co., Downingtown, Pa.								
..	..	..	C	..	3	.....	D	R	144	..	..
			United States Motor Truck Co., Cincinnati, O.								
SB	B	S	C	IC	3	35x3½	37x3½D	L	132	80	..
			Plymouth Motor Truck Co., Plymouth, O.								
SL	SD	S	F	F	10	34x3½	36x3D	L	128	..	..
			Trabold Truck Mfg. Co., Johnstown, Pa.								
SB	BR	M	W	S	3	36x4	38x4D	..	130	70	..

SPEEDWELL MODEL Y, 4000-LB. CHASSIS, $2850.
This chassis supplied with panel body, 126x72, $2950; stake body, same carrying space, $2950; flare board, same carrying space, $2950.

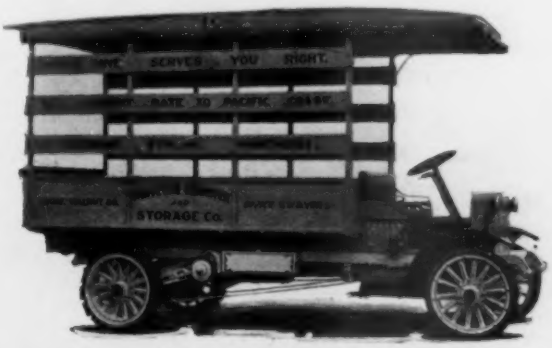
Commercial Cars

			O. Armleder Co., Cincinnati, O.								
SL	B	S	C	S	3	40x4	40x3½D	L	136	70	..
			Blair Mfg. Co., Newark, O.								
SI	S	S	W	S	3	34x4	36x3½D	R	121	73	..
			Martin Carriage Works, York, Pa.								
..	..	S	C	S	3	36x4	40x3½D	R	136	60	..
			F. A. Casey Co., Billerica, Mass.								
SB	B	S	C	S	3	36x4	36x4D	O	144	75	E

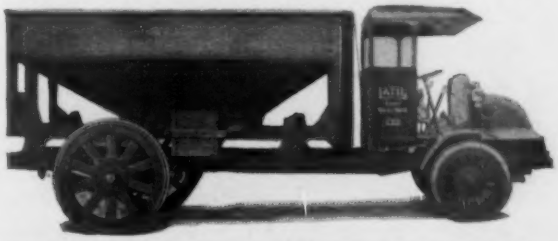
ROWE MODEL D, 4000-LB. COVERED FLARE BOARD, $3000.

Commercial Cars

			Hurlburt Motor Truck Co., New York City.								
F	E	S	W	S	3	34x4	34x4D	L	137	..	..
			Lauth-Juergens Motor Car Co., Fremont, O.								
..	M	S	C	S	4	38x5	38x4D	R	120	..	..
			Walter Motor Truck Co., New York City.								
SB	B	..	C	S	3	36x5	36x5D	R	132	..	..



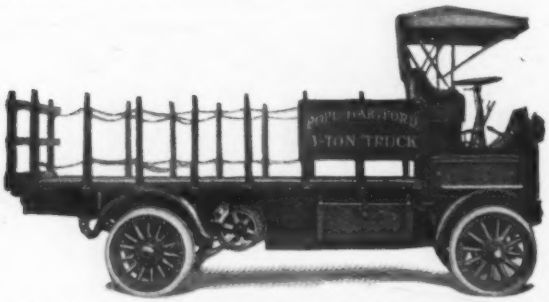
B. A. GRAMM'S 4000-LB. SEMI-ENCLOSED FLARE BOARD, CHASSIS, $2750.
Carrying space, 62x108.



WALTER 6000-LB. COVERED EXPRESS, CHASSIS, $3400.

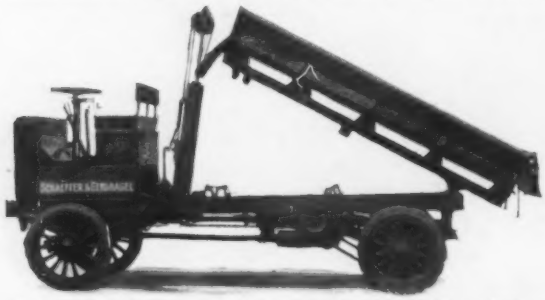
CRAWFORD 6000-LB. STAKE BODY, CHASSIS, $3000.

CROCE MODEL C, 6000-LB. FURNITURE VAN, CHASSIS, $4350.



POPE-HARTFORD 6000-LB. STAKE BODY, CHASSIS, $3350.
Carrying space, 168x78.

PEERLESS 6000-LB. SIDED STAKE BODY, CHASSIS, $3700.

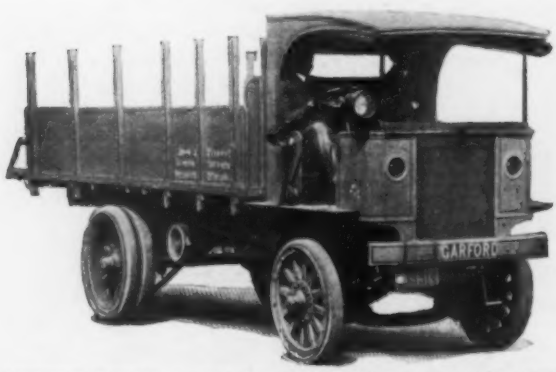


DAYTON MODEL A, 6000-LB. DUMPING BODY, $2250.

ROWE MODEL E, 6000-LB. ENCLOSED BODY, $3600.

6000 Pound Gasoline

Model	Chassis Weight	Chassis Price	Dimensions of Carrying Space	Height Load P'f'm	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	Cooling	Radiator
	Crawford Automobile Co., Hagerstown, Md.											
....	5600	3000	.....	42	12	32	4	4.5	5.5	P	W	V
	Croce Auto Works, Asbury Park, N. J.											
C	6000	3600	.....	36	15	36	4	4.75	5.5	P	W	..
	White Company, Cleveland, O.											
GTA	6100	*3850	.....	37	..	23	4	3.75	5.12	B	G	H
	Rowe Motor Mfg. Co., Downingtown, Pa.											
E	....	3400	.....	..	12	36	4	4.75	5.5	B	C	..
	United States Motor Truck Co., Cincinnati, O.											
D	6500	3500	144x72	43	15	32	4	4.5	5.5	P	C	C
	White Star Motor & Eng. Co., Brooklyn, N. Y.											
E	6600	3400	210x72	36	12	28	4	4.87	5.5	P	C	H
	Schleicher Motor Vehicle Co., New York City.											
....	....	4000	.....	..	20	..	4	....	....	P	G	H
	Abendroth & Root Mfg. Co., Newburgh, N. Y.											
3	5950	3500	.....	43	12	33	4	4.5	5.5	P	G	H
	Garford Co., Elyria, O.											
J	7750	3500	.....	47	13	29	4	4.25	5.25	B	C	T
	Atterbury Motor Car Co., Buffalo, N. Y.											
D	5700	....	.....	46	13	38	4	4.87	5.5	P	W	T
	Merchant & Evans Co., Philadelphia, Pa.											
3	5500	3000	144x72	43	15	27	4	4.12	5.25	B	C	H
	Pope Mfg. Co., Hartford, Conn.											
3	....	3350	168x78	44	12	36	4	4.75	5.5	P	C	P
	Peerless Motor Car Co., Cleveland, O.											
3	....	....	.....	..	14	32	4	4.5	6.5	P	C	C
	Kelly-Springfield Motor Truck Co., Springfield, O.											
K-40	7900	....	.....	38	11	32	4	4.5	6.5	P	C	V
	Driggs-Seabury Ordnance Corp., Sharon, Pa.											
....	6075	*3250	.....	37	13	29	4	4.33	5.5	P	T	H
	Dayton Auto Truck Co., Dayton, O.											
A	....	....	.....	..	10	36	4	4.75	5.5	P	C	H
	Plymouth Motor Truck Co., Plymouth, O.											
G-4	4500	*3000	.....	36	15	40	4	5	6	P	C	H



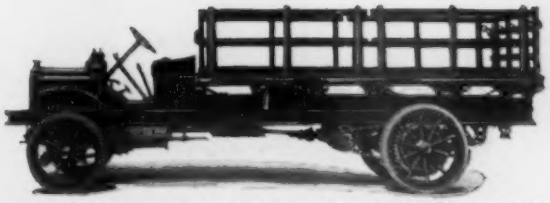
GARFORD MODEL J, 6000-LB. STAKE BODY, CHASSIS, $3500.

WHITE STAR MODEL E, 6000-LB. PANEL BODY, CHASSIS, $3400.
Carrying space, 180x72.

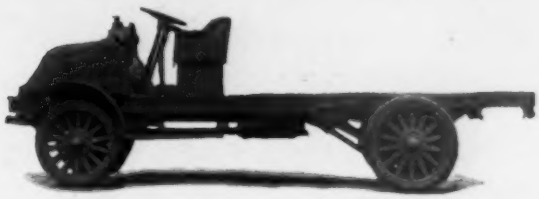
Commercial Cars

Carburetor	Ignition	Spark Plug Size	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering & Control	Wheelbase	% Weight on Rear Wheels	Engine Starter
Crawford Automobile Co., Hagerstown, Md.											
SB	R	S	C	S	3	34x4	37x4D	R	144	67	..
Croce Auto Works, Asbury Park, N. J.											
SL	B	S	C	S	3	36x5	36x5D	R	144	50	..
White Company, Cleveland, O.											
SP	B	..	C	S	4	.....	.....	L	163	..	..
Rowe Motor Mfg. Co., Downingtown, Pa.											
..	..	..	C	..	3	.....	D	R	156	..	..
United States Motor Truck Co., Cincinnati, O.											
SB	B	S	C	IC	3	35x5	37x5D	L	144	80	..
White Star Motor & Eng. Co., Brooklyn, N. Y.											
SB	E	½	C	S	4	36x5	36x5	R	163	65	..
Schleicher Motor Vehicle Co., New York City.											
SB	B	S	C	S	4	.....	.....	R	...	70	..
Abendroth & Root Mfg. Co., Newburgh, N. Y.											
..	B	½	C	S	3	36x5	36x4D	R	137	70	..
Garford Co., Elyria, O.											
SP	B	S	C	S	3	36x5	40x4D	R	128	68	..
Atterbury Motor Car Co., Buffalo, N. Y.											
SB	B	S	C	S	3	36x4	36x4D	R	153	70	..
Merchant & Evans Co., Philadelphia, Pa.											
SB	B	S	C	S	3	36x5	36x4D	R	132	65	..
Pope Mfg. Co., Hartford, Conn.											
SB	..	S	C	S	4	36x6	36x4D	L	139	..	..
Peerless Motor Car Co., Cleveland, O.											
SP	B	M	C	S	4	.....	D	R	151	74	..
Kelly-Springfield Motor Truck Co., Springfield, O.											
R	E	S	C	S	3	38x5	.....	L	150	75	..
Driggs-Seabury Ordnance Corp., Sharon, Pa.											
SB	B	S	C	S	3	36x5	34x4D	R	150	70	..
Dayton Auto Truck Co., Dayton, O.											
SB	B	S	C	S	3	.....	.....	L	136	..	..
Plymouth Motor Truck Co., Plymouth, O.											
SL	SD	S	F	F	10	34x4	36x3½D	L	140	..	..

A. & R. 6000-LB. PANEL BODY, CHASSIS, $3500.
Made by Abendroth & Root Mfg. Co.



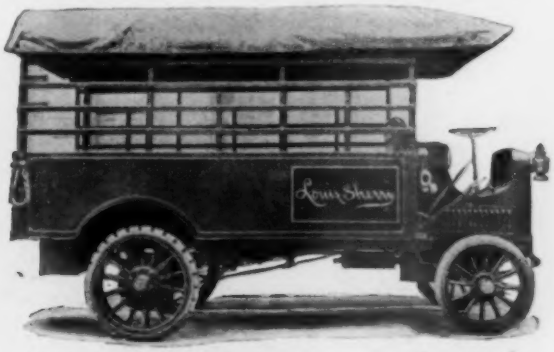
WHITE MODEL G-T-A, 6000-LB. PLATFORM BODY, $3850.



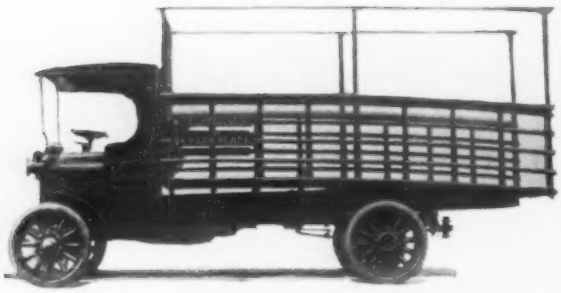
KELLY MODEL K-40, 6000-LB. CHASSIS, $3400.

UNITED STATES MODEL D, 6000-LB. STAKE BODY, CHASSIS, $3500.

VULCAN 6000-LB. SPECIAL COVERED EXPRESS, $3250.
Made by Driggs-Seabury Ordnance Corp.

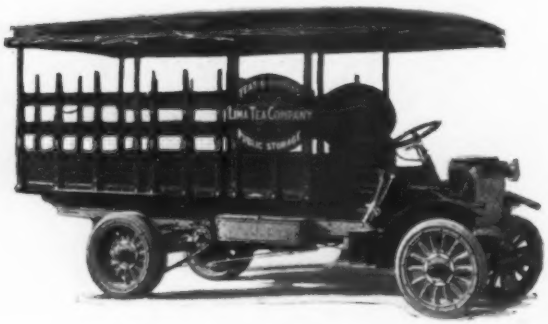


LATIL FRONT DRIVE, 6000-LB. COAL BODY, $3200.
Made by Walter Motor Truck Co.
This front drive also supplied with 8000-lb. body, $3500; 10,000-lb. body, $3750.



BLAIR MODEL E, 7000-LB. STAKE BODY, $3900.
Carrying space, 138 to 180x56. This chassis also supplied with panel body, same carrying space, $3900; flare board, same carrying space, $3910.

GARFORD MODEL D, 10,000-LB. MEAT AND FISH BODY, CHASSIS, $4500.



B. A. GRAMM'S 7000-LB. COVERED STAKE BODY, CHASSIS, $3600.
Carrying space, 144x66.
Made by Gramm-Bernstein Co.

DAYTON 8000-LB. ENCLOSED BODY, $2700.

PEERLESS 8000-LB. STAKE BODY, $4000.

7000 Pound Gasoline

Model	Chassis Weight	Chassis Price	Dimensions of Carrying Space	Height Load P'f'm	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	Cooling	Radiator
Gramm-Bernstein Co., Lima, O.												
5	7200	4500	156x66	37	10	41	6	4.12	5.25	T	C	C
3½	6000	3600	144x66	36	12	32	4	4.5	5.5	B	C	C
Knickerbocker Motor Truck Mfg. Co., New York City.												
14-3	5300	3750	.....	39	16	32	4	4.5	5.5	B	C	H
A. R. King Mfg. Co., Kingston, N. Y.												
3½	6200	3350	.....	42	12	32	4	4.5	5.5	P	C	T
Royal Motor Truck Co., New York City.												
B-3½	6000	3400	.....	34	12	36	4	4.75	5.5	P	C	H
Transit Motor Truck Co., Louisville, Ky.												
T	5500	3500	168x70	42	12	32	4	4.5	....	P	C	H
Blair Mfg. Co., Newark, O.												
E	6150	3750	138x56	34	12	32	4	4.5	5.5	P	C	H
Martin Carriage Works, York, Pa.												
L	6400	....	.....	40	12	36	4	4.75	5.5	P	C	T
Roland Gas Electric Vehicle Corp., New York City.												
3½	7500	3750	.....	39	14	32	4	4.5	6.75	P	C	T
Walter Motor Truck Co., New York City.												
....	5000	3750	.....	..	..	32	4	4.5	6	P	G	C

8000 Pound Gasoline

Abendroth & Root Mfg. Co., Newburgh, N. Y.												
4	6450	3700	.....	43	11	40	4	5	5.75	P	G	H
Knickerbocker Motor Truck Mfg. Co., New York City.												
14-4	5500	4000	.....	39	16	32	4	4.5	5.5	P	C	H
Merchant & Evans Co., Philadelphia, Pa.												
4	6500	3500	144x72	43	12	32	4	4.5	5.5	P	C	H
Peerless Motor Car Co., Cleveland, O.												
4	....	....	.....	..	12	32	4	4.5	6.5	P	C	C
Speedwell Motor Car Co., Dayton, O.												
Z	6600	3750	150x78	41	12	40	4	5	5	P	C	T
Driggs-Seabury Ordnance Corp., Sharon, Pa.												
....	7125	*4000	.....	37	14	29	4	4.33	5.5	P	T	H
F. A. Casey Co., Billerica, Mass.												
....	7300	3500	180x66	36	14	36	4	4.75	6	B	C	H
....	7300	3500	180x66	36	14	54	6	4.75	6	T	C	H
Dayton Auto Truck Co., Dayton, O.												
R	....	....	.....	..	10	36	4	4.75	5.5	P	C	H

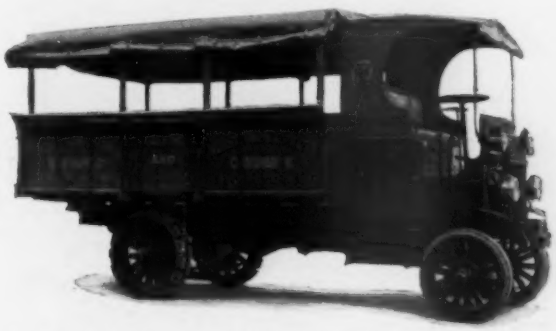
KING 7000-LB. COVERED EXPRESS. CHASSIS, $3350.

TRANSIT MODEL T, 7000-LB. FLARE BOARD, $3700.
Carrying space, 168x70. This chassis also supplied with panel body, $3750; and stake body, $3680, both having same carrying space as flare board.

Commercial Cars

Carburetor	Ignition	Spark Plug Size	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering & Control	Wheelbase	% Weight on Rear Wheels	Engine Starter
Gramm-Bernstein Co., Lima, O.											
SL	B	..	C	IC	4	.....	D	L	168	74	E
SL	B	..	C	IC	4	.....	D	R	140	70	E
Knickerbocker Motor Truck Mfg. Co., New York City.											
SB	B	S	C	S	3	36	36D	L	120	..	..
A. R. King Mfg. Co., Kingston, N. Y.											
SL	B	S	C	IC	3	36x5	36x5D	R	120	60	..
Royal Motor Truck Co., New York City.											
SB	B	..	C	S	3	36x5	40x5D	R	132	60	..
Transit Motor Truck Co., Louisville, Ky.											
R	M	S	C	S	3	.....	D	R	144	66	..
Blair Mfg. Co., Newark, O.											
SI	S	S	W	S	3	36x5	36x4D	R	121	75	..
Martin Carriage Works, York, Pa.											
..	..	S	C	S	3	36x5	40x4D	R	145	60	..
Roland Gas Electric Vehicle Corp., New York City.											
GA	E	S	E	..	2	37x5	41x5D	L	156	70	..
Walter Motor Truck Co., New York City.											
SB	B	..	C	IC	3	36x5	42x5D	R	156	..	..

SPEEDWELL MODEL Z, 8000-LB. FLARE BOARD, $3850.
Carrying space, 150x78. This chassis also supplied with stake and panel bodies, same carrying space and same price.

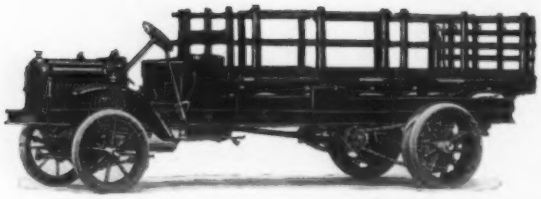


MARTIN MODEL L, 7000-LB. COVERED FLARE BOARD.

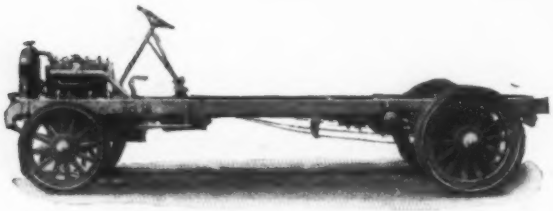
Commercial Cars

Abendroth & Root Mfg. Co., Newburgh, N. Y.											
..	B	½	C	S	3	36x5½	36x5D	R	137	70	..
Knickerbocker Motor Truck Mfg. Co., New York City.											
SB	B	S	C	S	3	36	36D	L	120	..	..
Merchant & Evans Co., Philadelphia, Pa.											
SB	B	S	C	S	2	36x6	36x5D	R	132	65	..
Peerless Motor Car Co., Cleveland, O.											
SP	B	M	C	S	4	.....	D	R	151	76	..
Speedwell Motor Car Co., Dayton, O.											
SL	E	S	C	S	3	36x5	36x5D	L	115	55	..
Driggs-Seabury Ordnance Corp., Sharon, Pa.											
SB	B	S	C	S	3	36x5	36x5D	R	156	70	..
F. A. Casey Co., Billerica, Mass.											
SB	B	S	C	S	3	40x5	40x5D	O	168	75	E
SB	B	S	C	S	3	40x5	40x5D	O	168	75	E
Dayton Auto Truck Co., Dayton, O.											
SB	B	S	C	S	2	.....	.....	L	136	..	..

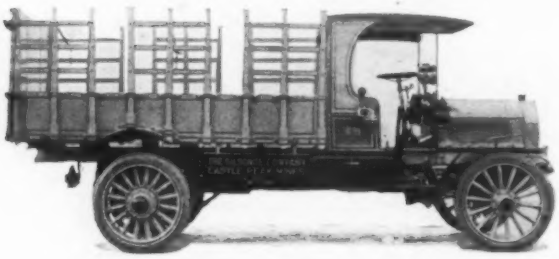
VULCAN 8000-LB. COVERED FLARE BOARD, $4000.
Made by Driggs-Seabury Ordnance Corp.



WHITE MODEL TC, 10,000-LB. PLATFORM BODY, $4700.

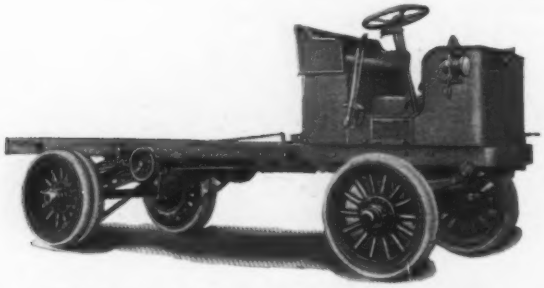


WALTER 10,000-LB. CHASSIS, $4500.

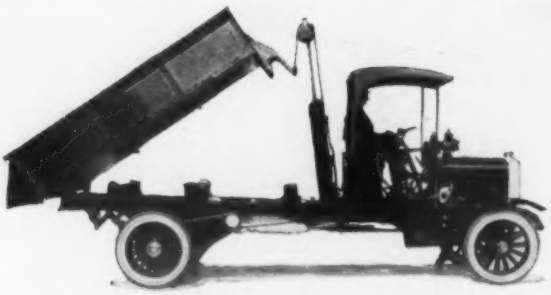


MACK 10,000-LB. STAKE BODY, CHASSIS, $4000.

GARFORD MODEL D, 10,000-LB. SPECIAL DAIRY BODY, CHASSIS, $4500.



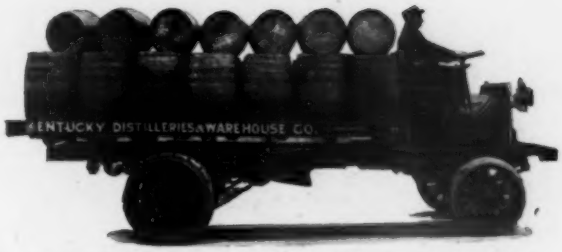
WITT-WILL MODEL Q-2-14, 10,000-lb. CHASSIS.



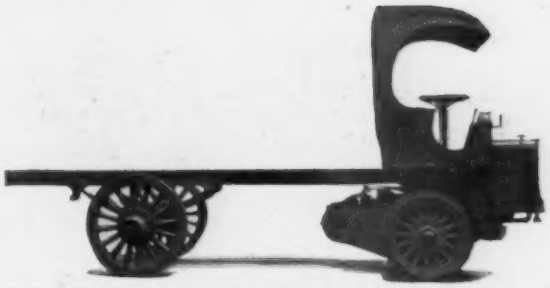
VULCAN 10,000-LB. DUMPING BODY.
Made by Driggs-Seabury Ordnance Corp.

10,000 Pound Gasoline

Model	Chassis Weight	Chassis Price	Dimensions of Carrying Space	Height Load F'f'm	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	Cooling	Radiator
Atterbury Motor Car Co., Buffalo, N. Y.												
E	6600	....	.....	49	11	38	4	4.87	5.5	P	W	T
Abendroth & Root Mfg. Co., Newburgh, N. Y.												
5	7200	4350	.....	43	9	40	4	5	5.75	P	G	H
Dayton Auto Truck Co., Dayton, O.												
L	....	....	.....	..	10	44	4	5.25	7	P	C	H
Witt-Will Co., Washington, D. C.												
Q-2-14	9000	....	.....	41	12	32	4	4.5	5.5	P	C	T
White Co., Cleveland, O.												
TC	6845	*4700	.....	37	..	29	4	4.25	5.75	B	G	H
Rowe Motor Mfg. Co., Downingtown, Pa.												
I	....	4550	.....	..	12	48	4	5.5	6	P	C	C
International Motor Co., New York City.												
Mack	8500	4000	.....	44	12	48	4	5.5	6	P	C	C
White Star Motor & Eng. Co., Brooklyn, N. Y.												
G	8600	4250	210x72	36	12	38	4	4.87	5.5	P	C	H
Walter Motor Truck Co., New York City.												
....	5800	4500	.....	..	..	32	4	4.5	6	P	G	C
Peerless Motor Car Co., Cleveland, O.												
5	....	....	.....	..	10	32	4	4.5	6.5	P	C	C
Royal Motor Truck Co., New York City.												
A-5	7000	4500	.....	34	12	36	4	4.75	5.5	P	C	H
F. B. Stearns Co., Cleveland, O.												
5	6500	3800	.....	45	12	36	4	4.75	6	S	C	H
5	6500	3900	.....	45	12	36	4	4.75	6	S	C	H
Transit Motor Truck Co., Louisville, Ky.												
V	7600	4500	168x72	42	10	32	4	4.5	....	P	C	H
V	7600	4500	168x72	42	10	32	4	4.5	....	P	C	H
Kelly-Springfield Motor Truck Co., Springfield, O.												
K-50	10000	....	.....	40	9	32	4	4.5	6.5	P	C	..
Driggs-Seabury Ordnance Corp., Sharon, Pa.												
....	7415	*4500	.....	39	14	29	4	4.33	5.5	P	T	H
Knickerbocker Motor Truck Mfg. Co., New York City.												
14-5	6400	4500	.....	39	14	32	4	4.5	5.5	P	C	H
Merchant & Evans Co., Philadelphia, Pa.												
8	5600	2750	144x72	47	10	27	4	4.12	5.25	B	C	H
Pope Mfg. Co., Hartford, Conn.												
5	....	4350	168x78	44	10	36	4	4.75	5.5	P	C	P
Garford Co., Elyria, O.												
E	9650	4500	.....	46	10	29	4	4.25	5.25	B	C	T



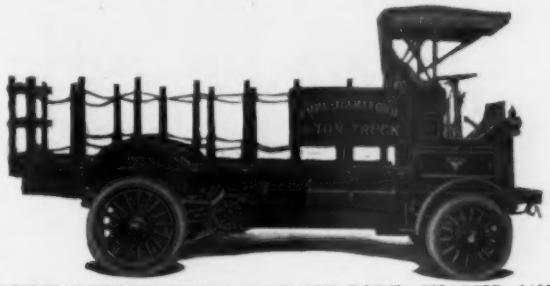
TRANSIT MODEL V, 10,000-LB. STAKE BODY, $4680.
Carrying space, 168x72. This chassis also supplied with panel body, $4750; flare board body, $4700; and power dump, $5050, all having same carrying space as stake body.



MERCHANT & EVANS 10,000-LB. TRACTOR, CHASSIS, $2750.
This chassis fitted with stake body, 144x72, $3000.

Commercial Cars

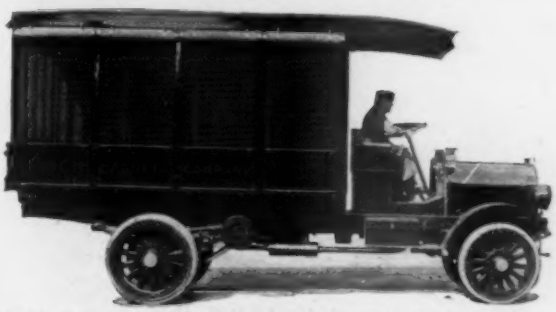
Carburetor	Ignition	Spark Plug Size	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering & Control	Wheelbase	% Weight on Rear Wheels	Engine Starter
Atterbury Motor Car Co., Buffalo, N. Y.											
SB	B	S	C	S	3	36x5	42x5D	R	153	70	..
Abendroth & Root Mfg. Co., Newburgh, N. Y.											
..	B	½	C	S	3	36x6	36x5D	R	137	70	..
Dayton Auto Truck Co., Dayton, O.											
SB	B	S	C	S	3	.....	.....	L	148	..	..
Witt-Will Co., Washington, D. C.											
SL	E	S	C	S	3	36x6	36x5D	R	130	60	..
White Co., Cleveland, O.											
SB	B	..	C	S	4	.....	D	L	165	..	..
Rowe Motor Mfg. Co., Downingtown, Pa.											
..	..	..	C	..	3	.....	D	R	171	..	..
International Motor Co., New York City.											
..	B	S	C	S	3	36x5	36x5D	R	156	48	..
White Star Motor & Eng. Co., Brooklyn, N. Y.											
SP	E	½	C	S	4	36x5	36x5	R	168	65	..
Walter Motor Truck Co., New York City.											
SB	B	..	C	IC	3	38x6	42x6	R	156	..	..
Peerless Motor Car Co., Cleveland, O.											
SP	B	M	C	S	4	.....	D	R	151	77	..
Royal Motor Truck Co., New York City.											
SB	B	..	C	S	3	36x6	40x6D	R	138	60	..
F. B. Stearns Co., Cleveland, O.											
SB	B	S	C	S	4	34x5	38x5D	L	144	65	..
SB	B	S	C	S	4	34x5	38x5D	L	210	65	..
Transit Motor Truck Co., Louisville, Ky.											
R	M	S	C	IC	3	.....	D	R	144	66	..
R	M	S	C	IC	3	.....	D	R	156	66	..
Kelly-Springfield Motor Truck Co., Springfield, O.											
R	E	S	C	S	3	38x6	.....	L	150	75	..
Driggs-Seabury Ordnance Corp., Sharon, Pa.											
SB	B	S	C	S	3	36x6	36x6D	R	162	70	..
Knickerbocker Motor Truck Mfg. Co., New York City.											
SB	B	S	C	S	3	36	36D	L	134	..	..
Merchant & Evans Co., Philadelphia, Pa.											
SB	E	S	C	S	3	34x7	40x6†	R	114	80	..
Pope Mfg. Co., Hartford, Conn.											
SP	..	S	C	S	4	36x7	42x6D	L	140	..	..
Garford Co., Elyria, O.											
SB	B	S	B	S	4	36x6	40x6D	R	128	75	..



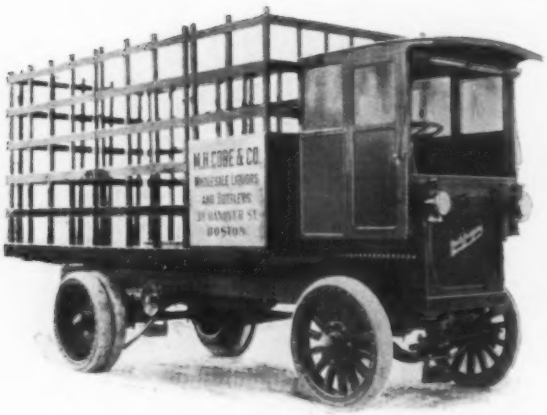
POPE-HARTFORD 10,000-LB. STAKE BODY, CHASSIS, $4350.
Carrying space, 168x78.

DAYTON 10,000-LB. SIDED STAKE BODY, $3150.

PEERLESS 10,000-LB. STAKE BODY, $4500.



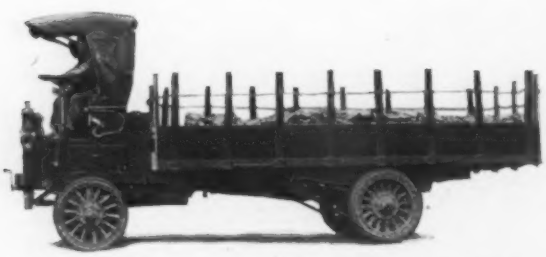
STEARNS 10,000-LB. SCREEN SIDE COVERED EXPRESS, CHASSIS, $3800.
This chassis also supplied with 15-ft. wheelbase at $3900.



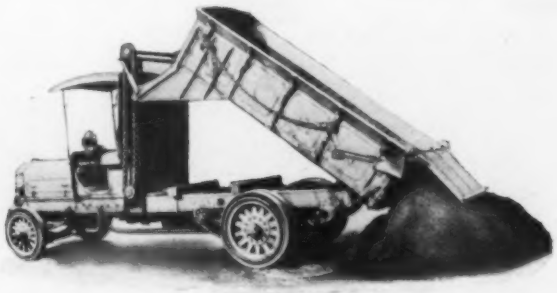
LAUTH-JUERGENS MODEL J, 10,000-LB. PLATFORM BODY WITH SLAT SIDES. CHASSIS, $4500.
This chassis also supplied with stake platform, 180x72, $4700.

MERCEDES-DAIMLER MODEL F, 12,000-LB. STAKE BODY WITH TRAILER.
Made by General Vehicle Co.

GARFORD MODEL F, 12,000-LB. DAIRY BODY. CHASSIS, $4850.



SPEEDWELL MODEL X, 12,000-LB. STAKE BODY, $4500.
Carrying space, 186x81. This chassis also supplied with stake and panel bodies, same carrying space and same price.



VULCAN 14,000-LB. DUMPING BODY.
Made by Driggs-Seabury Ordnance Corp.

10,000 Pound Gasoline

Model	Chassis Weight	Chassis Price	Dimensions of Carrying Space	Height Load F'f'm	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	Cooling	Radiator
Locomobile Co. of America, Bridgeport, Conn.												
A	9245	4800	.....	46	10	40	4	5	6	P	C	C
Lauth-Juergens Motor Car Co., Fremont, O.												
J	7400	4500	210x72x36 ..	10	36	4	4.75	5.5		P	C	C
Pierce-Arrow Motor Car Co., Buffalo, N. Y.												
R-4	....	4500	....	14	38	4	4.87	6		P	C	T

12,000 Pound Gasoline

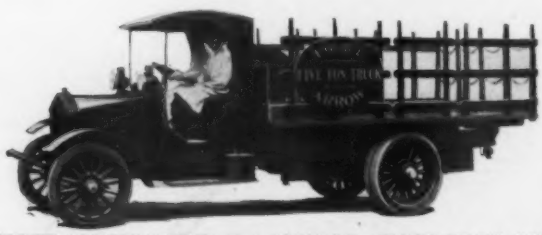
General Vehicle Co., Inc., Long Island City, N. Y.												
Mercedes	6380	....	.....	48	10	29	4	4.25	5.9	P	C	H
Garford Co., Elyria, O.												
F	9950	4850	.....	48	9	29	4	4.25	5.25	B	C	T
Speedwell Motor Car Co., Dayton, O.												
X	7200	4400	216x81	41	10	40	4	5	5	P	C	T
Dayton Auto Truck Co., Dayton, O.												
E	....	....	....	10	44	4	5.25	7		P	C	H

14,000 Pound Gasoline

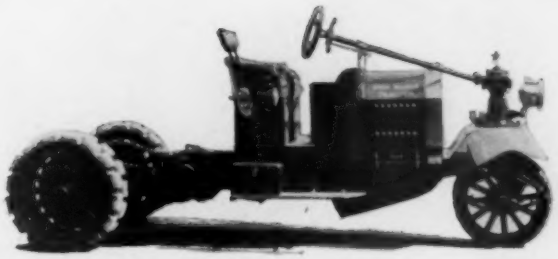
Knox Automobile Co., Springfield, Mass.												
31	5700	3250	....	25	40	4	5	4.75		S	C	C
Driggs-Seabury Ordnance Corp., Sharon, Pa.												
....	7450	*6000	.....	40	11	36	4	4.75	5.5	P	T	H
International Motor Co., New York City.												
Saurer	7000	5800	.....	34	9	31	4	4.37	5.5	P	C	H
Dayton Auto Truck Co., Dayton, O.												
S	....	....	....	10	44	4	5.25	7		P	C	H

20,000 Pound Gasoline

Knox Automobile Co., Springfield, Mass.												
32	6200	3750	....	20	40	4	5	5.5		S	C	C



PIERCE-ARROW MODEL R-4, 10,000-LB. STAKE BODY, $4500.



KNOX-MARTIN 14,000-LB. TRACTOR, TRACTOR ONLY, $3250.

LOCOMOBILE MODEL A, 10,000-LB. STAKE BODY, SLAT SIDES, CHASSIS, $4800.

Commercial Cars

Carburetor	Ignition	Spark Plug Size	Drive	Transmission	Speeds Forward	Front Tires	Rear Tires	Steering & Control	Wheelbase	% Weight on Rear Wheels	Engine Starter
Locomobile Co. of America, Bridgeport, Conn.											
SB	B	S	C	S	4	.....	D	R	140	70	..
Lauth-Juergens Motor Car Co., Fremont, O.											
O	M	S	C	S	4	40x6	40x6D	R	140	..	..
Pierce-Arrow Motor Car Co., Buffalo, N. Y.											
SP	B	..	W	S	3	36x5	40x6D	R	168	66	..

Commercial Cars

General Vehicle Co., Inc., Long Island City, N. Y.											
SP	B	S	IG	S	4	34x5	40x6D	R	169	80	..
Garford Co., Elyria, O.											
SP	B	S	C	S	4	36x6	40x7D	R	128	77	..
Speedwell Motor Car Co., Dayton, O.											
SL	E	S	C	S	3	36x6	36x6D	L	139	55	..
Dayton Auto Truck Co., Dayton, O.											
SB	B	S	C	S	3	.....	.....	L	148	..	..

Commercial Cars

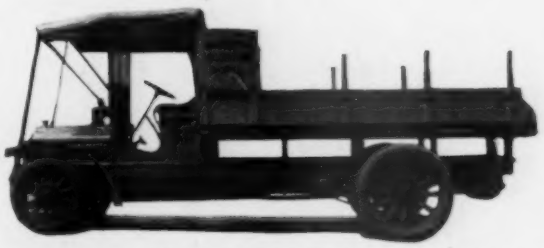
Knox Automobile Co., Springfield, Mass.											
SB	B	S	C	S	3	34x5	34x4D	R	139	..	..
Driggs-Seabury Ordnance Corp., Sharon, Pa.											
SB	B	S	C	S	4	36x7	42x7D	R	156	70	..
International Motor Co., New York City.											
SP	..	M	C	S	4	36x5	42x6D	R	156	50	..
Dayton Auto Truck Co., Dayton, O.											
SB	B	S	C	S	3	.....	.....	L	148	..	..

Commercial Cars

Knox Automobile Co., Springfield, Mass.											
SB	B	S	C	S	3	34x5	34x4D	R	140	..	..

KNOX-MARTIN 20,000-LB. TRACTOR, TRACTOR ONLY, $3750.

DAYTON MODEL E, 12,000-LB. STAKE BODY, $3500.

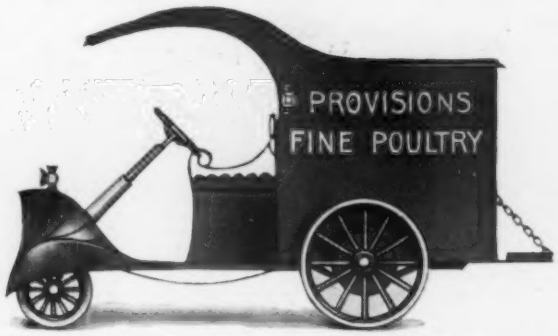


SAURER 14,000-LB. PLATFORM STAKE BODY, CHASSIS, $5800.

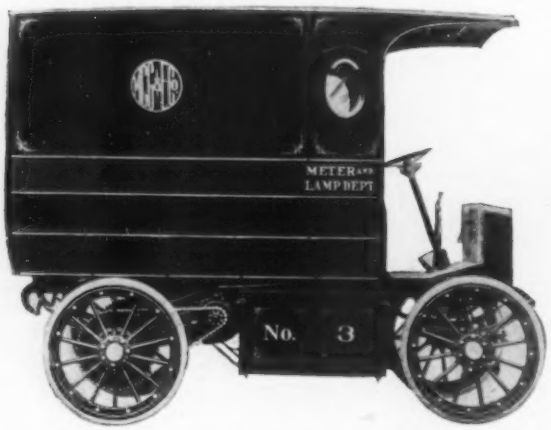
B. A. GRAMM'S 10,000-LB. CHASSIS, $4500.
Made by Gramm-Bernstein Co.
Carrying space, 156x66.

DAYTON MODEL M, 14,000-LB. TRUCK WITH TRAILER, $3950.

G. V. 750-LB. CANVAS SIDE EXPRESS, CHASSIS, $1370.
Made by General Vehicle Co.



HUEBNER MODEL 6, 500-LB. ENCLOSED PARCEL BODY, $500.
Carrying space, 48x42x46. This chassis also supplied with stake and flare board bodies, same carrying space and same price.



URBAN MODEL 10, 1000-LB. PANEL BODY.
Made by Kentucky Wagon Mfg. Co.
Carrying space, 72x42. This chassis also supplied with express body, same carrying space.

500 Pound Electric

Model	Chassis Weight	Chassis Price	Dimensions of Carrying Space	Height Load P'f'm	Maximum Speed	Mileage per Charge	Motor	Battery
O. E. Huebner, Brooklyn, N. Y.								
6	800	*500	48x46x42	..	10	35	..	..
Commercial Truck Co. of America, Philadelphia, Pa.								
A	1500	1440	.....	34	15	..	GE	..

750 Pound Electric

Ward Motor Vehicle Co., New York City.								
EO	1800	1050	.....	30	14	60	SS	O
General Vehicle Co., Long Island City, N. Y.								
....	2500	1370	.....	58	12	45	GE	..

1000 Pound Electric

Baker Motor Vehicle Co., Cleveland, O.								
X	3243	1900	.....	36	15	45	GE	EX
Kentucky Wagon Mfg. Co., Louisville, Ky.								
10	3220	....	72x42	34	12	50	SS	ES
General Vehicle Co., Long Island City, N. Y.								
....	3080	1700	.....	60	12	45	GE	..
Commercial Truck Co. of America, Philadelphia, Pa.								
B	1750	1640	.....	34	15	..	GE	..
Atlantic Vehicle Co., Newark, N. J.								
10-C	2700	....	78x42	31	16	..	GE	E

1250 Pound Electric

Ward Motor Vehicle Co., New York City.								
EA	2100	1450	.....	31	12	50	SS	O

1500 Pound Electric

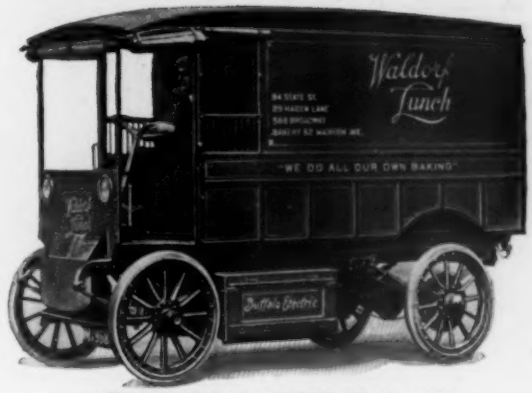
Buffalo Electric Vehicle Co., Buffalo, N. Y.								
....	....	2200	.....	39	12	45	GE	P

2000 Pound Electric

Baker Motor Vehicle Co., Cleveland, O.								
O	4495	2300	.....	40	13	40	GE	EX

G. V. 1000-LB. PANEL BODY, CHASSIS, $1700.
Made by General Vehicle Co.

ATLANTIC MODEL 10C, 1000-LB. COVERED FLARE BOARD, $2000.
Carrying space, 78x42.



BUFFALO 1500-LB. PANEL BODY, $2700.

Commercial Cars

Battery Capacity	Controller	Speeds Forward	Drive	Rear Axle	Front Tires	Rear Tires	Steering & Control	% Weight on Rear Wheels	Wheelbase
				O. E. Huebner, Brooklyn, N. Y.					
...	..	3	..	D	20x1	28x2	..	..	72
				Commercial Truck Co. of America, Philadelphia, Pa.					
...	C	3	W	F	36x2½	36x2½	L	60	85

Commercial Cars

				Ward Motor Vehicle Co., New York City.					
126	..	4	C	D	30x2½	32x3	R	..	80
				General Vehicle Co., Long Island City, N. Y.					
102	..	4	C	S	32x2½	32x2½	C	50	76

Commercial Cars

				Baker Motor Vehicle Co., Cleveland, O.					
112	C	5	C	D	36x3	36x3	L	57	86
				Kentucky Wagon Mfg. Co., Louisville, Ky.					
165	C	4	C	D	36x3	36x3	L	59	86
				General Vehicle Co., Long Island City, N. Y.					
153	..	4	C	S	36x2½	36x2½	C	50	87
				Commercial Truck Co. of America, Philadelphia, Pa.					
...	C	3	W	F	36x2½	36x3	L	60	90
				Atlantic Vehicle Co., Newark, N. J.					
...	GE	4	..	..	36x3	36x3	L	..	102

Commercial Cars

				Ward Motor Vehicle Co., New York City.					
150	..	4	C	D	32x3	34x3½	R	..	84

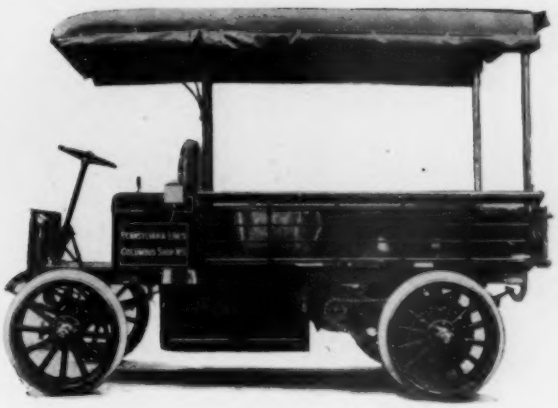
Commercial Cars

				Buffalo Electric Vehicle Co., Buffalo, N. Y.					
135	GE	5	S	..	36x3½	36x3¼	L	55	102

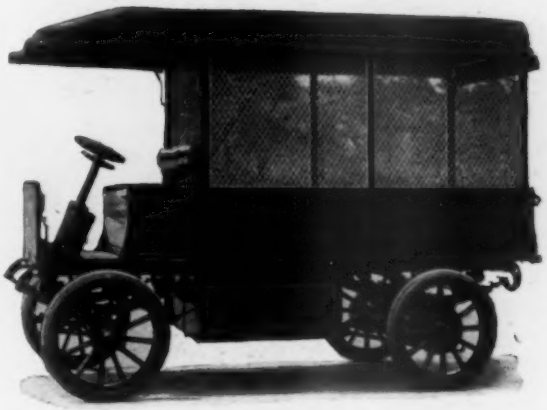
Commercial Cars

				Baker Motor Vehicle Co., Cleveland, O.					
140	C	5	C	D	36x3½	36x3½	L	57	102

C. T. MODEL B, 1000-LB. PANEL BODY, $1940.
Made by Commercial Truck Co. of America.
This chassis also furnished with stake body, $1840; flare board body, $1840.



ATLANTIC MODEL 1-C, 2000-LB. COVERED FLARE BOARD, CHASSSIS, $2200.
Carrying space, 102x60.



C. T. MODEL C, 2000-LB. SCREEN SIDE EXPRESS, CHASSIS, $2095.
Made by Commercial Truck Co. of America.
This chassis also furnished with panel body, $2420; stake body, $2320; flare board body, $2320.

G. V. 2000-LB. COVERED SCREEN SIDE EXPRESS, CHASSIS, $2100.
Made by General Vehicle Co.

G. V. 4000-LB. PLATFORM STAKE BODY, CHASSIS, $2600.
Made by General Vehicle Co.

G. V. 7000-LB. COVERED STAKE BODY, CHASSIS, $3250.
Made by General Vehicle Co.

C. T. MODEL E, 7000-LB. STAKE BODY, $3880.
Made by Commercial Truck Co. of America.
This chassis furnished with panel body, $4030; flare board body, $3880.

ATLANTIC MODEL 2-C, 4000-LB. SCREEN SIDE, $3250.
Carrying space, 126x60.

URBAN MODEL 20, 2000-LB. COVERED FLARE BOARD.
Made by Kentucky Wagon Mfg. Co.
Carrying space, 103x48. This chassis also supplied with panel and express bodies, same carrying space.

2000 Pound Electric

Model	Chassis Weight	Chassis Price	Dimensions of Carrying Space	Height Load P'f'm	Maximum Speed	Mileage per Charge	Motor	Battery
			Kentucky Wagon Mfg. Co., Louisville, Ky.					
20	5048	....	103x48	37	10	45	SS	ES
			Buffalo Electric Vehicle Co., Buffalo, N. Y.					
....	....	2400	.....	39	12	45	GE	P
			General Vehicle Co., Long Island City, N. Y.					
....	4105	2100	.....	60	10	45	GE	..
			Commercial Truck Co. of America, Philadelphia, Pa.					
C	2300	2095	.....	37	12	..	GE	..
			Atlantic Vehicle Co., Newark, N. J.					
1-C	2770	....	102x60	36	10	..	GE	E

2500 Pound Electric

			Ward Motor Vehicle Co., New York City.					
EB	2900	1900	.....	32	10	45	SS	O

4000 Pound Electric

			Baker Motor Vehicle Co., Cleveland, O.					
U	5842	2800	.....	42	10	40	GE	EX
			Kentucky Wagon Mfg. Co., Louisville, Ky.					
40	6568	....	132x68	43	9	45	SS	ES
			General Vehicle Co., Long Island City, N. Y.					
....	5755	2600	.....	..	9	45	GE	..
			Commercial Truck Co. of America, Philadelphia, Pa.					
D	3100	2725	.....	37	10	..	GE	..
			Atlantic Vehicle Co., Newark, N. J.					
2-C	3590	....	126x60	39	10	..	GE	E

5000 Pound Electric

			Ward Motor Vehicle Co., New York City.					
EC	4600	2400	.....	33	8	40	SS	O

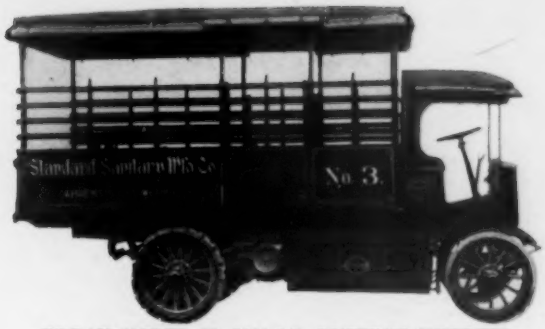
7000 Pound Electric

			Baker Motor Vehicle Co., Cleveland, O.					
CC	8634	3500	.....	44	9	40	GE	EX
			Kentucky Wagon Mfg. Co., Louisville, Ky.					
70	8612	....	148x80	46	8	40	SS	ES
			General Vehicle Co., Long Island City, N. Y.					
....	7655	3250	.....	..	8	40	GE	..
			Commercial Truck Co. of America, Philadelphia, Pa.					
E	5000	3530	.....	42	9	..	GE	..
			Atlantic Vehicle Co., Newark, N. J.					
3-C	5220	....	144x72	44	8	..	GE	E

10,000 Pound Electric

			Ward Motor Vehicle Co., New York City.					
ED	6700	2950	.....	34	6	35	SS	O
			General Vehicle Co., Long Island City, N. Y.					
....	8615	3700	.....	..	7	35	GE	..
			Commercial Truck Co. of America, Philadelphia, Pa.					
F	6000	3935	.....	42	7	..	GE	..
			Atlantic Vehicle Co., Newark, N. J.					
5-C	6230	....	156x72	44	7	..	GE	E

URBAN MODEL 40, 4000-LB. PLATFORM BODY.
Made by Kentucky Wagon Mfg. Co.
Carrying space, 132x68.



URBAN MODEL 70, 7000-LB. COVERED EXPRESS.
Made by Kentucky Wagon Mfg. Co.
Carrying space, 148x80.

Commercial Cars

Battery Capacity	Controller	Speeds Forward	Drive	Rear Axle	Front Tires	Rear Tires	Steering & Control	% Weight on Rear Wheels	Wheelbase
				Kentucky Wagon Mfg. Co., Louisville, Ky.					
165	C	4	C	D	36x3½	36x5	L	62	109
				Buffalo Electric Vehicle Co., Buffalo, N. Y.					
165	GE	5	S	..	36x3½	36x3½	L	55	102
				General Vehicle Co., Long Island City, N. Y.					
204	..	4	C	S	36x3½	36x3½	C	50	102
				Commercial Truck Co. of America, Philadelphia, Pa.					
...	C	4	SP	..	36x3½	36x4	L	60	100
				Atlantic Vehicle Co., Newark, N. J.					
...	GE	4	C	D	34x3½	36x4	L	..	103

Commercial Cars

				Ward Motor Vehicle Co., New York City.					
204	..	4	C	D	34x3½	36x5	R	..	96

Commercial Cars

				Baker Motor Vehicle Co., Cleveland, O.					
168	C	5	C	D	36x4	36x3D	L	60	120
				Kentucky Wagon Mfg. Co., Louisville, Ky.					
193	C	4	C	D	36x4	36x4D	L	68	116
				General Vehicle Co., Long Island City, N. Y.					
255	..	4	C	S	36x4	36x3	C	50	112
				Commercial Truck Co. of America, Philadelphia, Pa.					
...	C	4	SP	..	36x5	36x3½D	L	60	116
				Atlantic Vehicle Co., Newark, N. J.					
...	GE	4	C	D	34x4	36x3D	L	..	114

Commercial Cars

				Ward Motor Vehicle Co., New York City.					
276	..	4	C	D	36x5	38x3½D	..	..	...

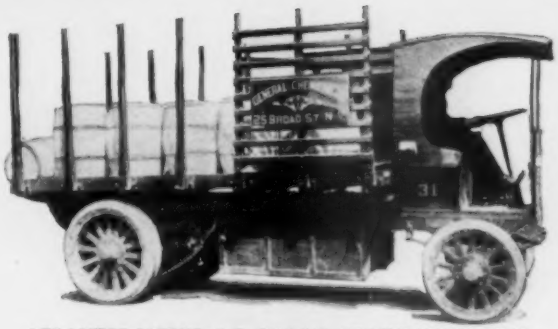
Commercial Cars

				Baker Motor Vehicle Co., Cleveland, O.					
224	C	5	C	D	36x6	38x4D	L	60	137
				Kentucky Wagon Mfg. Co., Louisville, Ky.					
275	C	4	C	D	36x5	40x6D	L	71	130
				General Vehicle Co., Long Island City, N. Y.					
331	..	4	C	S	36x6	36x3½D	C	50	128
				Commercial Truck Co. of America, Philadelphia, Pa.					
...	C	4	SP	..	36x3½D	36x4D	L	50	115
				Atlantic Vehicle Co., Newark, N. J.					
...	GE	4	C	D	36x5	40x4D	L	..	135

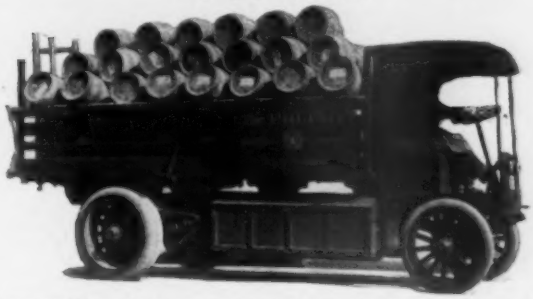
Commercial Cars

				Ward Motor Vehicle Co., New York City.					
360	..	4	C	D	38x3½D	40x5D	..	..	...
				General Vehicle Co., Long Island City, N. Y.					
382	..	4	C	S	36x7	36x5D	C	50	139
				Commercial Truck Co. of America, Philadelphia, Pa.					
...	C	4	SP	..	36x4D	36x5D	L	50	132
				Atlantic Vehicle Co., Newark, N. J.					
...	GE	4	C	D	36x6	40x5D	L	..	144

BAKER MODEL CC, 7000-LB. ENCLOSED BODY, CHASSIS, $3500.



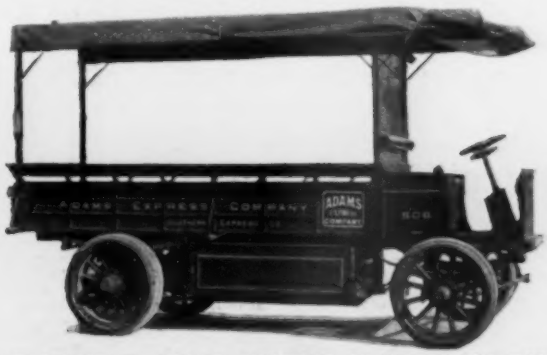
ATLANTIC MODEL 3-C, 7000-LB. STAKE BODY, $3950.
Carrying space, 144x72.



ATLANTIC MODEL 5-C, 10,000-LB. OPEN TRUCK, $5200.
Carrying space, 156x72.

G. V. 10,000-LB. SPECIAL ICE BODY, CHASSIS, $3700.
Made by General Vehicle Co.

C. T. MODEL F, 10,000-LB. STAKE BODY, $4310.
Made by Commercial Truck Co. of America.
This chassis also furnished with panel body, $4460; flare board body, $4310.



C. T. MODEL D, 4000-LB. COVERED FLARE BOARD BODY, $3000.
Made by Commercial Truck Co. of America.
This chassis also furnished with panel body, $3150; stake body, $3000.

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500 Pound Commercial Cars

Pr.	Cyl.	H.P.	Body	Maker	Page
*$400	2	11	Box.	Tarrytown Motor Car Co.	16D
* 500	Electric.	Parcel.	O. E. Huebner.		42
1440	Electric.	Commercial Truck Co. of America.			42

600 Pound Commercial Car

* 550	4	14	Panel.	Touraine Co.	16D

750 Pound Commercial Cars

* 425	2	8	Tricar.	Maxim Tricar Mfg. Corp.	16D
* 475	2	18	Box.	Light Commercial Car Co.	16D
* 900	4	27	Express.	Willys-Overland Co.	16D
* 950	4	27	Panel.	Willys-Overland Co.	16D
1050	Electric.	Ward Motor Vehicle Co.			42
1370	Electric.	Canvas Side Express.	General Vehicle Co.		42

1000 Pound Commercial Cars

925	2	16	Sullivan Motor Car Co.		16D
*1000	4	20	Flare Board.	Krebs Commercial Car Co.	16D
1055	3	*32	Stake.	Brockway Motor Truck Co.	16D
*1150	4	20	Panel.	Krebs Commercial Car Co.	16D
*1150	4	20	Flare Board.	Gabriel Auto Co.	16D
1155	3	*32	Flare Board.	Brockway Motor Truck Co.	16D
1205	4	32	Flare Board.	Brockway Motor Truck Co.	16D
1305	4	32	Flare Board.	Brockway Motor Truck Co.	16D
1640	Electric.	Commercial Truck Co. of America.			42
1700	Electric.	Panel.	General Vehicle Co.		42
*1840	Electric.	Flare Bd.	Commercial Truck Co. of America.		42
*1840	Electric.	Stake.	Commercial Truck Co. of America.		42
1900	Electric.	Baker Motor Vehicle Co.			42
*1940	Electric.	Panel.	Commercial Truck Co. of America.		42
*2000	Electric.	Flare Board.	Atlantic Vehicle Co.		42

1250 Pound Commercial Cars

1450	Electric.	Ward Motor Vehicle Co.			42
1600	4	23	Stake.	Tiffin Wagon Co.	16D

1500 Pound Commercial Cars

* 900	3	*34	Flare Board.	Chase Motor Truck Co.	20
975	4	20	Trabold Truck Mfg. Co.		18
*1000	2	13	Flare Board.	Auglaize Motor Car Co.	18
*1100	4	20	Panel.	Kearns Motor Truck Co.	18
*1350	4	23	Covered Flare Board.	Shop of Seibert.	18
1350	4	27	Covered Flare.	Willys-Overland Co.	18
1425	4	23	Panel.	Krebs Commercial Car Co.	18
*1500	4	20	Flare Board.	Bowling Green Motor Car Co.	18
*1525	4	23	Flare Board.	Krebs Commercial Car Co.	18
*1600	4	23	Screen Side.	Krebs Commercial Car Co.	18
*1625	4	23	Stake.	Stewart Motor Corp.	20
*1625	4	23	Covered Flare Board.	Stewart Motor Corp.	20
*1650	4	23	Covered Flare Board.	Gabriel Auto Co.	18
1650	4	23	Huselton Motor Car Co.		18
1650	4	23	Lippard-Stewart Motor Car Co.		18
1650	4	23	Maccarr Co.		18
1650	4	23	Sandusky Auto Parts & Motor Truck Co.		18
*1700	4	23	Stake.	Gabriel Auto Co.	18
*1750	4	23	Panel.	Gabriel Auto Co.	18
*1750			Flare Board.	Huselton Motor Car Co.	18
*1775	4	23	Covered Express.	Lippard-Stewart Motor Car Co.	18
*1775	4	23	Flare Board.	Lippard-Stewart Motor Car Co.	18
*1775			Covered Express.	Huselton Motor Car Co.	18
*1800	4	23	Panel.	Lippard-Stewart Motor Car Co.	18
*1800	4	23	Stake.	Lippard-Stewart Motor Car Co.	18
*1800	4	23	Flare Board.	Rowe Motor Mfg. Co.	18
*1825	4	23	Covered Flare Board.	Maccarr Co.	18
2200	Electric.	Buffalo Electric Vehicle Co.			42
2350	4	23	Covered Flare Board.	White Co.	20

2000 Pound Commercial Cars

735	2	22	H. J. Koehler S. G. Co.		22
* 750	2	22	Flare Board.	H. J. Koehler S. G. Co.	22
* 775	2	22	Stake.	H. J. Koehler S. G. Co.	22
* 750	2	22	Covered Express.	H. J. Koehler S. G. Co.	22
* 800	2	22	Plumbers' & Contractors'.	H. J. Koehler S. G. Co.	22
* 800	2	22	Canvas Side.	H. J. Koehler S. G. Co.	22
* 825	2	22	Open.	H. J. Koehler S. G. Co.	22
* 900	2	22	Panel.	H. J. Koehler S. G. Co.	22
* 925	2	22	Bakers'.	H. J. Koehler S. G. Co.	22
1110	2	20	Stewart Iron Works Co.		24
*1140	2	16	Flare Board.	Sullivan Motor Car Co.	24
*1150			Flare Board.	Stewart Iron Works Co.	24
*1150	2	16	Stake.	Sullivan Motor Car Co.	24
*1150			Stake.	Stewart Iron Works Co.	24
1200	3	*32	Palmer-Moore Co.		24
*1250			Screen Side.	Stewart Iron Works Co.	24
1250	2	*32	Palmer-Moore Co.		24
*1400	4	18	Flare Board.	Mora Power Wagon Co.	22
1400 to 1600	4	23	Flare Board.	Auglaize Motor Car Co.	20
*1400 to *1600	4	23	Stake.	Auglaize Motor Car Co.	20
*1600	4	23	Stake.	Auglaize Motor Car Co.	20
*1475			Flare Board.	Dayton Motor Truck Co.	34
1475	4	23	Trabold Truck Mfg. Co.		28
*1400	4	23	Panel.	Brockway Motor Truck Co.	20
*1500	4	18	Flare Board with Slat Extension.	Mora Power Wagon Co.	22
*1325	4	23	Flare Board.	Krebs Commercial Car Co.	22
*1600 to *1800	4	23	Panel.	Auglaize Motor Car Co.	20
1650	4	27	F. A. Casey Co.		26
1600	4	26	Sanford Motor Truck Co.		24
*1700	4	23	Panel.	Bowling Green Motor Car Co.	22
1700	4	26	Flare Board.	Standard Motor Truck Co.	24
*1850	4	23	Panel.	Croce Auto Works.	20
*1850	4	26	Plymouth Motor Truck Co.		26
*1850	4	23	Flare Board.	Croce Auto Works.	20
*1850	4	23	Covered Flare Board.	Interboro Motor Truck Co.	26
*1900			Covered Flare Bd.	White Star Motor & Eng. Co.	24
1900	4	23	Maccarr Co.		20
*1932	4	23	Covered Flare Board.	Adams Bros. Co.	20
*1938	4	23	Stake Platform.	Adams Bros. Co.	20
*1950	4	23	Covered Flare Board.	F. Coleman C. & H. Co.	22
*2000	4	32	Covered Flare Board.	International Motor Co.	32
*2000	4	23	Screen Side.	Lord Baltimore Truck Co.	24
2000	4	23	Covered Flare Board.	Selden Motor Vehicle Co.	24
*2000	4	23	Covered Flare Board.	Tiffin Wagon Co.	26
*2000	4	23	Kelly-Springfield Motor Truck Co.		26
2000	4	23	Gramm-Bernstein Co.		22
*2075	4	26	Flare Board.	C. L. Barker	20
2085	Electric.	Screen Side Express.	Commercial Truck Co. of America		44
2100	Electric.	General Vehicle Co.			44
2100	4	23	Screen Side Express.	Lauth-Juergens	24
*2175	4	29	Covered Express.	Rowe Motor Mfg. Co.	34
*2200	4	27	Screen Side Express.	O. Armleder Co.	20
*2200	4	27	Stake.	Gabriel Auto Co.	22
2200	Electric.	Covered Flare Board.	Atlantic Vehicle Co.		44
*2150	4	27	Covered Flare Board.	Gabriel Auto Co.	22
*2250	4	27	Panel.	Gabriel Auto Co.	22
2250	4	23	Flare Board.	Lange Motor Truck Co.	24
2300	Electric.	Baker Motor Vehicle Co.			42
*2330	Electric.	Stake.	Commercial Truck Co. of America.		44
*2330	Electric.	Flare Bd.	Commercial Truck Co. of America.		44
2400	Electric.	Buffalo Electric Vehicle Co.			44
*2420	Electric.	Panel.	Commercial Truck Co. of America.		44
*2275	4	40	Flare Board.	Knox Automobile Co.	22
*2450	4	40	Panel.	Knox Automobile Co.	22
*7235	4	40	Stake.	Knox Automobile Co.	22

2500 Pound Commercial Cars

1900	Electric.	Ward Motor Vehicle Co.			44
*1200	3	*34	Panel.	Chase Motor Truck Co.	26
*1250	3	*34	Express.	Chase Motor Truck Co.	26
2000	4	23	Corbitt Automobile Co.		26
*2075	4	23	Flare Board.	Corbitt Automobile Co.	26
*2085	4	23	Stake.	Corbitt Automobile Co.	26

3000 Pound Commercial Cars

*1800	4	27	Flare Board.	Trabold Truck Mfg. Co.	30
*1800	4	32	Flare Board Express.	Starbuck Auto Co.	30
1800	4	76	Covered Flare Board.	Standard Motor Truck Co.	28
*1800	4	23	Flare Board.	Krebs Commercial Car Co.	28
*1850	2	18	Panel.	Autocar Co.	26
*1850	2	18	Covered Flare Board.	Autocar Co.	26
1875	3	*40	Stake.	Brockway Motor Truck Co.	28
1910	4	36	Sanford Motor Truck Co.		28
*1950	4	27	Flare Board.	Brockway Motor Truck Co.	28
1950	4	27	Bowling Green Motor Car Co.		28
*1975	4	23	Stake.	Krebs Commercial Car Co.	28
*2000	4	23	Screen Side.	Krebs Commercial Car Co.	28
*2000	4	27	Stake.	Brockway Motor Truck Co.	28
2000	4	36	Standard Motor Truck Co.		28
*2000	4	23	Flare Board.	Sandusky Auto Parts & Motor Truck Co.	28
2100	4	23	Flare Board.	Tegetmeier & Riepe Co.	28
2100	4	23	Screen Side.	Tegetmeier & Riepe Co.	28
2150	4	27	Screen Side Covered Express.	Maccarr Co.	28
*2150	4	27	Panel.	Brockway Motor Truck Co.	28
2150	4	32	Enclosed Express.	O. Armleder Co.	28
*2250	4	22	Middleboro Auto Exchange		28
2300	4	27	Adams Bros. Co.		26
*2300	4	28	Panel.	Lippard-Stewart Motor Car Co.	26
*2300	3	*40	Mansur Motor Truck Co.		28
*2350	4	32	Stake Platform.	O. Armleder Co.	28
*2375	4	32	Flare Board.	O. Armleder Co.	28
*2400	4	27	Covered Express.	Hahn Motor Truck & Wagon Co.	30
*2400			Flare Board.	Mansur Motor Truck Co.	28
*2420	4	27	Stake.	Adams Bros. Co.	26
2442	4	27	Flare Board.	Adams Bros. Co.	26
*2450	4	32	Panel.	O. Armleder Co.	28
2500	4	23	Sandusky Auto Parts & Motor Truck Co.		30
*2050	4	27	Flare Board.	Gabriel Auto Co.	28
*2725	4	20	Open Express.	Rowe Motor Mfg. Co.	28
*2750	4	27	Panel.	Gabriel Auto Co.	28
3000	4	23	White Co.		30
*3000	4	27	Sided Platform.	Blair Mfg. Co.	28
*3000	4	27	Panel.	Blair Mfg. Co.	28
*3010	4	27	Flare Board.	Blair Mfg. Co.	28
*3150	4	23	Covered Flare Board.	White Co.	30
*3150	4	23	Platform.	White Co.	30

4000 Pound Commercial Cars

Pr.	Cyl.	H.P.	Body	Maker	Page
1900	4	36	Stake.	Dayton Auto Truck Co.	30
2900			Stake.	Erie Truck Mfg. Co.	30
2300	4	27	Lord	Baltimore Truck Co.	32
2400	4	29	Stake.	F. Coleman C. & H. Co.	30
2450	4	29	Trabold	Truck Mfg. Co.	32
*2500	4	27	Covered Flare Board.	Adams Bros. Co.	30
2900	Electric.		General	Vehicle Co.	44
*2900	4	36	Plymouth	Motor Truck Co.	32
*2930	4	27	Stake.	Adams Bros. Co.	30
*2942	4	27	Flare Board.	Adams Bros. Co.	30
*2950	4	29	Covered Flare Board.	G. A. Schacht Motor Truck Co.	32
2700	4	27	Tiffin	Wagon Co.	32
2735	Electric.		Commercial	Truck Co. of America	44
2750	4	29	Covered Express.	White Star Motor & Eng. Co.	32
2750	4	32	Semi-enclosed Flare Bd.	Gramm-Bernstein Co.	32
2750			Covered Flare Board.	Driggs-Seabury Ordnance Corp.	30
2900	4	29	Croce	Auto Works	32
2900	4	27	Covered Flare Board.	United States Motor Truck Co.	32
2900	Electric.		Baker	Motor Vehicle Co.	44
2900	4	33	Flare Board.	Lauth-Juergens Motor Car Co.	30
2900	4	32	Willet	Engine & Truck Co.	32
2950	4	27	Speedwell	Motor Car Co.	32
2950	4			Transit Motor Truck Co.	30
*2950	4	27	Flare Board.	Speedwell Motor Car Co.	32
*2950	4	27	Panel.	Speedwell Motor Car Co.	32
3000	4	27	Covered Flare Board.	Lange Motor Truck Co.	32
*3000	4	36	Covered Flare Board.	Bowe Motor Mfg. Co.	32
3000	4	27	Lange	Motor Truck Co.	32
*3000	Electric.		Flare Bd.	Commercial Truck Co. of America	44
*3000	4	26	Stake.	Pierce-Arrow Motor Car Co.	30
*3000	Electric.		Stake.	Commercial Truck Co. of America	44
*3025	4		Stake.	Transit Motor Truck Co.	30
*3030	4		Flare Board.	Transit Motor Truck Co.	30
*3150	Electric.		Panel.	Commercial Truck Co. of America	44
*3250	Electric.		Screen Side.	Atlantic Vehicle Co.	44
*3950	4		Panel.	Transit Motor Truck Co.	30
3500	4			Schleicher Motor Vehicle Co.	32

5000 Pound Commercial Cars

2400	Electric.		Ward	Motor Vehicle Co.	44
2500	4	32	Covered Slat.	O. Armleder Co.	32
2700	4	36	F. A.	Casey Co.	32
*3400	4	32	Panel.	Blair Mfg. Co.	32
*3400	4	32	Stake.	Blair Mfg. Co.	32
*3410	4	32	Flare Board.	Blair Mfg. Co.	32

6000 Pound Commercial Cars

*2250	4	36	Dumping.	Dayton Auto Truck Co.	34
3000	4	27	Merchant &	Evans Co.	34
*3000	4	40	Plymouth	Motor Truck Co.	34
3000	4	32	Stake.	Crawford Automobile Co.	34
*3200			Coal.	Walter Motor Truck Co.	34
*3250	4	29	Special Covered Express.	Driggs-Seabury Ordnance Corp.	34
3250	4	36	Stake.	Pope Mfg. Co.	34
3400	4	32	Kelly-Springfield	Motor Truck Co.	34
3400	4	26	Covered Express.	Walter Motor Truck Co.	32
3400	4	38	Panel.	White Star Motor & Eng. Co.	34
3450	4	36	Stake.	Lauth-Juergens Motor Car Co.	32
3500	4	29	Stake.	Garford Co.	34
3500	4	33	Panel.	Abendroth & Root Mfg. Co.	34
3500	4	27	Stake.	Hurlburt Motor Truck Co.	32
3500	4	32	Stake.	United States Motor Truck Co.	34
3600	4	36	Croce	Auto Works	34
*3600	4	36	Enclosed.	Bowe Motor Mfg. Co.	34
3700	4	32	Sided Stake.	Peerless Motor Car Co.	34
*3850	4	23	Platform.	White Co.	34
4000	4			Schleicher Motor Vehicle Co.	34
4350	4	36	Furniture Van.	Croce Auto Works	34

7000 Pound Commercial Cars

3250	Electric.		General	Vehicle Co.	44
*3350	4	32	Covered Express.	A. B. King Mfg. Co.	36
3400	4	36	Royal	Motor Truck Co.	36
3500	4	32	Transit	Motor Truck Co.	36
3500	Electric.		Baker	Motor Vehicle Co.	44
3530	Electric.		Commercial	Truck Co. of America	44
*3600	4	32	Covered	Stake. Gramm-Bernstein Co.	36
*3600	4	32	Stake.	Transit Motor Truck Co.	36
*3700	4	32	Flare Board.	Transit Motor Truck Co.	36
3750	4	32	Knickerbocker	Motor Truck Mfg. Co.	36
3750	4	32	Blair	Mfg. Co.	36
*3750	4	32	Panel.	Transit Motor Truck Co.	36
3750	4	32	Roland Gas	Electric Vehicle Corp.	36
3750	4	32	Walter	Motor Truck Co.	36
*3800	Electric.		Stake.	Commercial Truck Co. of America	44
*3800	Electric.		Flare Bd.	Commercial Truck Co. of America	44
*3900	4	32	Stake.	Blair Mfg. Co.	36
*3950	Electric.		Stake.	Atlantic Vehicle Co.	44
*4030	Electric.		Panel.	Commercial Truck Co. of America	44
4500	6	41	Gramm-Bernstein	Co.	36

8000 Pound Commercial Cars

*2700	4	36	Enclosed.	Dayton Auto Truck Co.	36
3500	6	56	F. A.	Casey Co.	36
3500	4	32	Merchant &	Evans Co.	36
3500	4	36	F. A.	Casey Co.	36
3700	4	40	Abendroth &	Root Mfg. Co.	36
3750	4	40	Speedwell	Motor Car Co.	36
*3850	4	40	Flare Board.	Speedwell Motor Car Co.	36
*4000	4	29	Covered Flare Board.	Driggs-Seabury Ordnance Corp.	34
4000	4	32	Knickerbocker	Motor Truck Mfg. Co.	36
*4000	4	32	Stake.	Peerless Motor Car Co.	36
*4500	4	29	Meat & Fish.	Garford Co.	36

10,000 Pound Commercial Cars

2750	4	27	Tractor.	Merchant & Evans Co.	38
2950	Electric.		Ward	Motor Vehicle Co.	44
*3000	4	27	Stake Body Tractor.	Merchant & Evans Co.	38
*3150	4	32	Sided Stake.	Dayton Auto Truck Co.	38
3700	Electric.		General	Vehicle Co.	44
3800	4	36	Screen Side Covered Express.	F. B. Stearns Co.	38
3900	4	36	F. B.	Stearns Co.	36
3935	Electric.		Commercial	Truck Co. of America	44
4000	4	48	Stake.	International Motor Co.	38
4250	4	38	White Star	Motor & Eng. Co.	38
*4110	Electric.		Flare Bd.	Commercial Truck Co. of America	44
*4110	Electric.		Stake.	Commercial Truck Co. of America	44
4150	4	40	Abendroth &	Root Mfg. Co.	38
4350	4	36	Stake.	Pope Mfg. Co.	38
*4400	Electric.		Panel.	Commercial Truck Co. of America	44
4500	4	32	Walter	Motor Truck Co.	38
4500	4	36	Royal	Motor Truck Co.	38
*4500			Gramm-Bernstein	Co.	40
*4500	4	32	Stake.	Peerless Motor Car Co.	38
4500	4	32	Knickerbocker	Motor Truck Co.	38
4500	4	29	Special Dairy.	Garford Co.	38
*4500	4	38	Stake.	Pierce-Arrow Motor Car Co.	40
*4500	4	36	Platform Body with Slat Sides.	Lauth-Juergens Motor Car Co.	40
4550	4	29	Bowe	Motor Mfg. Co.	38
*4700	4	36	Stake Platform.	Lauth-Juergens Motor Car Co.	40
*4700	4	32	Flare Board.	Transit Motor Truck Co.	38
*4700	4	29	Platform.	White Co.	38
*4750	4	32	Panel.	Transit Motor Truck Co.	38
*4800	4	40	Stake Body Slat Sides.	Locomobile Co. of America	40
*4860	4	32	Stake.	Transit Motor Truck Co.	38
*5050	4	32	Power Dump.	Transit Motor Truck Co.	38
*5200	Electric.		Open	Truck. Atlantic Vehicle Co.	44

12,000 Pound Commercial Cars

3500	4	44	Stake.	Dayton Auto Truck Co.	40
4400	4	40	Speedwell	Motor Car Co.	40
*4500	4	40	Stake.	Speedwell Motor Car Co.	40
*4500	4	40	Panel.	Speedwell Motor Car Co.	40
*4850	4	29	Dairy.	Garford Co.	40

14,000 Pound Commercial Cars

3270	4	40	Tractor.	Knox Automobile Co.	40
3950	4	44	Truck with Trailer.	Dayton Auto Truck Co.	40
*5800	4	31	Platform Stake.	International Motor Co.	40

20,000 Pound Commercial Cars

3750	4	40	Tractor.	Knox Automobile Co.	40

How Much Will Your Truck Save Us

By LEN G. SHAW

A SALESMAN in a middle western city secured an interview with the president of a wholesale hardware house, and broached the subject of motor trucks. Almost before the salesman had started to explain his mission the manager broke in with:

"Exactly how much will one of your trucks save us a month?"

It happened that the only other wholesale hardware establishment in the city still clung to horse-drawn vehicles, hence there was no opportunity to make close comparison in this quarter. The salesman was frank about the matter. He had investigated the situation, and was familiar with the requirements in a general way.

"I can't tell you exactly, offhand," he began. "We have no trucks engaged in your line, you see, and"——

"Jenkins was here this morning," snapped the president, "and told me just how much we'd save by using his truck." The salesman knew what he faced. The experience was not new.

"That is his affair," he said, in even tones. "If he wants to make assertions of such a nature, without positive knowledge, I can't stop him. I prefer to give facts. Now, for the Edwards Company, which is the nearest approach to your concern with which I am familiar"——

"I don't care what you can do for the Edwards Company," stormed the president. "They're running their own affairs. All I want to know is what you can do for us. I want to deal with a man who knows what he is doing."

"It seems to me that is just what you don't want," said the salesman. "For that reason I think this interview had better come to an end. I'm not going to put out a statement that I can't back up. I know exactly what our trucks have done where they were given a fair trial, and I know what they ought to do for you. But you can take it from me that I'm not going to give you a lot of figures I can't substantiate just to close a sale even if Jenkins does do it that way. We're in business to stay and know that if we should sell you a truck and it didn't come up to our claims we wouldn't get your future business.

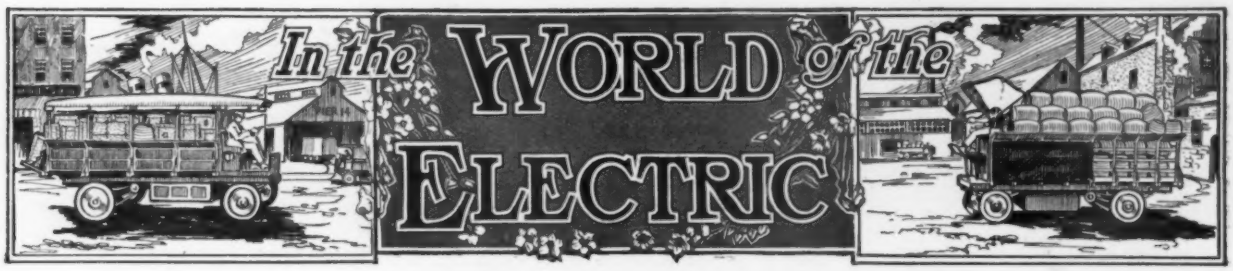
"Jenkins was here this morning," snapped the president, "and told me just how much we'd save by using his truck."

"Do you sell hardware that way? Not by a blamed sight. If you did you'd never build up much of a trade. When you sell a bill of goods you personally stand back of every item. If you caught one of your representatives making claims that you felt you might not be able to live up to—shooting hot air—you'd fire him on the spot, wouldn't you? And you'd be justified in doing it.

"That is my position on the truck proposition. That's why we can't get together."

"Hold on a minute, not so fast now," said the hardware man, as his caller started for the door. "Sit down and let's talk this thing over a bit."

When the salesman left two hours later he carried with him an order for a truck, sold through the fairness of his attitude.



The Edison Storage Battery—Its Inception and Method of Manufacture

A Trip Through the Plant at Orange, N. J.

By E. S. FOLJAMBE

ALL those interested in the mechanical transportation of merchandise should be interested in the internals of the Edison Storage Battery, and how they are produced. The business man and the average reader are non-technical, and it is for their benefit that we now propose with their permission to take them on a trip of observation and inquiry through the nearly completed plant of the Edison Storage Battery Company, Lakeside Avenue, Orange, N. J. Nearly completed applies merely to the present buildings, which large as they seem, are but the beginning, and will undoubtedly sink into insignificance in comparison with the ultimate plant which is to supply the world with this type of battery.

It may be of interest to know why the wizard of electricity when at the age of fifty-five, after a lifetime of activity, phenomenal successes, and unusual achievements, should undertake to solve what is perhaps the most difficult problem, and one as far reaching in its effect as either the electric light or the phonograph.

As a young man Edison deprived himself of not only luxuries, but necessities, in order to purchase the desired chemicals, wire, glass jars, etc., with which to experiment. When the first storage battery became a reality, and the details were published, he conducted an exhaustive and most comprehensive investigation with the materials at hand, only to come to the conclusion that there were decided limitations to such a combination. Other matters of more pressing moment had to be entered upon but not, however, until he had made a mental resolve that at some future time he would continue his line of research.

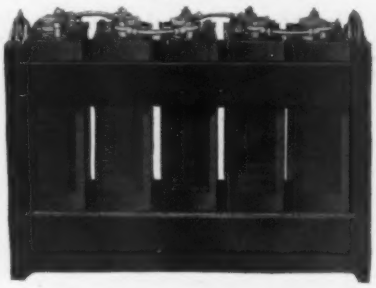
When returning to New York one afternoon in the spring of 1900, Mr. Edison was blocked by the congestion of traffic near the Cortland Street Ferry. This was in the days before the efficient police squad. For over two hours he watched the seething mass of wagons, horses, men and goods, and entered at the time in his notebook the following:

"Problem:—Narrow streets. Comparatively large street area covered by a horse-drawn vehicle. Slow speed. Limited loads. Congestion. Resulting delay and expense therefrom. Depreciation excessive."

Directly under this he wrote "Solution:—Electrically driven trucks, covering one-half the street area, having twice the speed, with two or three times the carrying capacity, and sufficiently rugged and practical to be operated by present teamsters. Development necessary:—Running gear;—easy. Motor drive;—easy. Control;—simple. Battery;—(?)"

Discovery of a New Reaction

That interrogation point was the cause of seven years of uninterrupted toil, and the expenditure of over $2,000,000, which resulted in the perfected Edison Storage Battery. He started with the idea well



The Edison Storage Battery—A 5-Cell

fixed in mind that nature could certainly afford one more reaction for the production of the electric current without the use of acids. The enormous, almost unsurmountable detail which had to be carried through is almost beyond belief. Over 50,000 separate and distinct experiments were made, and the results of each carefully tabulated and plotted as curves before the final battery was evolved. After innumerable experiments he at last struck upon a reaction, which although it appeared weak at the beginning, was very promising. This one reaction was followed with most intense persistency for fully three years, before even the first unimproved type of nickel-iron-alkaline battery was produced. How could this battery be made in quantities? The difficulties were many, and for four years more this man Edison, the greatest inventor of his age, worked at the mechanical details of process after process, and machine after machine, which were necessary in order to produce batteries in commercial quantities.

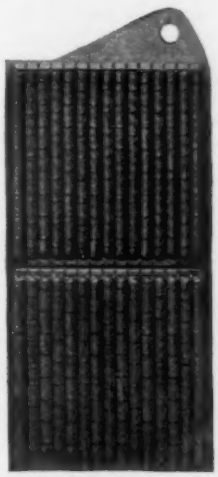
Non-technical Statement of the Theory of the Edison Battery

Electricity, the unknown quantity, is handled owing solely to a knowledge of its effects. What it is we cannot say, but what it will do we know full well, under certain set conditions. Any storage battery consists of a positive and a negative plate submerged in a jar in a liquid known as the electrolyte. Its value is dependent upon the fact that the elements of this combination are changed chemically by passing a current through them, but in such a way that the attempts of nature to bring back these elements to their original condition produces electricity. The greater the surface presented by the plates the greater the current produced. The positive plate of the Edison cell is composed of vertical rows of thin, perforated, steel tubes filled with nickel hydrate, these tubes being supported by a very light steel frame. The negative plate consists of rows of flat, perforated, steel jackets filled with iron oxide, these pockets also being arranged on a steel frame. The electrolyte is a solution of potash. At this point the reader's attention is called to the fact that this battery differs from all other storage batteries, in fact it is the only battery, the elements of which are not attacked by the solution in which they are submerged when left standing in a charged or discharged condition for an indefinite period. It has been shown that the battery is composed of but four things, nickel, iron oxide, and steel, in a solution of potash, and surprising as it may seem, the potash is a preservative of all the elements entering into the combination; thus the battery elements do not destroy each other.

Iron oxide, the chief ingredient of the negative plate is nothing more nor less than iron rust. When the two plates are connected externally to a magneto or other source of current, it is found that the iron rust is changed to metallic iron and the oxygen goes over to the nickel hydrate of the positive plate, oxidizing it and forming a new kind of nickel oxide, which was unknown to science before the discovery of this reaction by Mr. Edison. The oxidizing of the hydrate tends to cause it to swell into a cylindrical shape, but this does no harm in this battery, as the green nickel hydrate is contained in

perforated steel tubes, reinforced by small seamless steel bands. The iron oxide, when the battery is fully charged, has been converted to metallic iron. If, however, the process is reversed and instead of passing the current through, the external wires are connected to each other, it will be found that a current is generated and the various substances tend to go back to their original state, nickel oxide to a lower oxide, and the iron to iron oxide.

At this stage of the development, however, it was found that the high electrical resistance of nickel oxide retarded the passage of the current, and thus cut down materially the possible electrical output, and it became necessary to provide some method by which the electricity could reach all parts of the nickel hydrate. This was done in a most ingenious and effective manner, as will be described later, by the use of metallic flake nickel, dividing the



Edison Positive Plate
Made up of tubes containing layers of nickel hydrate separated by layers of pure matallic flake nickel

nickel hydrate into very thin layers. The conductivity of the iron oxide of the negative plate is good, but is slightly increased by the addition of a little mercury oxide.

Through the Factory

At the present time it is impossible to see the processes in exactly the proper order, but for the benefit of the reader, these will be described as nearly as possible in their logical sequence.

To begin with the nickel hydrate is obtained at Silver Lake in Jersey, in the form of lumps of dark green matter, somewhat of the consistency of caked earth. These are crushed and pulverized to the desired fineness, the resulting powder being placed in "The Barrel," where within a fabric bag the nickel hydrate is mixed with water. The too-fine powder goes out with the water as a solution. The green paste-like residue in the bag is then spread in pans and dried in rooms forming ovens, and this is the nickel hydrate used.

Filling the Tubes Which Form the Positive Plate

The difficulty of this operation can be realized when it is understood that each of these short tubes, only about 4 in. in

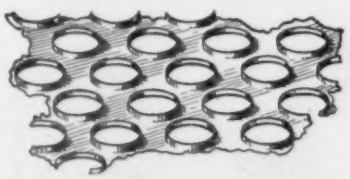
Top of Edison Cell
Showing the terminals at the ends and the filler cap opened

length, has about 350 distinct layers of nickel hydrate separated by an equal number of layers of pure metallic flake nickel, each of which must make electrical contact with the sides of the tube. To obtain the pure metallic flake nickel, was in itself a difficult problem, which was solved, however, by Edison in a novel and picturesque manner as will be described when we reach that part of the process.

The filling machines which are the special design of the great inventor are most ingenious, resembling somewhat in general appearance small stamp mills with vertical tamping rods playing up and down into the steel tubes which are being filled. The nickel hydrate, a green dry powder, is fed into the tubes in most accurately measured charges, and simultaneously the automatically measured quantity of flake nickel drops into the tube, and the tamps pound it under a pressure of 2500 lbs. to the square inch into a pure metallic sheet of great thinness reaching from side to side of the tube, and making metallic contact with the tube. The tubes to withstand this great pressure while being filled are held in a solid steel die. The accuracy of this tube-filling process is extremely great, and goes on with clocklike precision, everything being automatic, men simply filling the hoppers above the machines. As the eight tubes in a machine become filled the little tamps or pounding rods automatically cease their vertical motion.

Microscopic Inspection

Sample tubes are sectioned, and carefully examined under a microscope, the layers of nickel and nickel hydrate being counted to determine the accuracy of the automatic machines. The ends of the tubes containing the successive layers are then drilled



How the Rings Are Formed
A piece of a punched steel disc from which the rings are cut

out, making the mass of material an exact length, when little caps of nickeled steel are forced into place at the ends. The tops of the tube are pinched together holding the caps, and at the same time forming a flat, chisel-shaped end which fits into a groove of the frame of light steel which holds a collection of these tubes, forming a positive plate. After the tubes are capped, they are passed on to a machine which has a little hopper which is constantly vibrated and filled with small steel bands or rings. These are fed by gravity and vibration of the machine down into place in such a position that the tube can be forced through them by a plunger working from the side, so that when the tube is removed it is encircled by four equally spaced seamless steel bands. These effectively prevent any swelling in use when the nickel hydrate becomes oxidized.

At this point let us take a look at the machine which produces the little steel

Edison Negative Plate
This plate contains perforated steel pockets filled with black iron oxide

rings. At once one is struck by the fact that the nickeled steel sheet from which the bands are made is thinner than the width of the bands. This result is accomplished easily as follows: The sheets of steel are fed into a multiple punch which not only forces out a circular disc, but at the same time flanges downward a rim of metal to the depth desired for the ring width, and this rim being cut off forms the band. This will be more clearly understood by reference to the accompanying sketch.

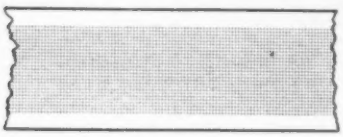
Forming the Steel Tubes for the Positive Plate

The formation of the perforated tubes, the filling of which with nickel hydrate we have just described, is another process which required long study, and the development of several special machines. The tubes are not drawn or rolled, but are automatically wound upon a mandrel from a ribbon of steel. This ribbon which is on reels much as moving pictures are handled, is first thoroughly cleaned, and then passed between roller-like dies which perforate it leaving an unperforated margin, as shown in the accompanying illustration. The burr left after the perforating process, is then

removed by passing the ribbon before an emery wheel. The perforations and surface are then thoroughly cleaned by passing it between revolving steel brushes. It is then further cleaned on a special nickeling machine by passing it from the reels into a hot cyanide solution, then through water into the nickeling bath, from which it is again wound on reels.

The Tube-Winding Machine

These are placed on the special tube winding machines, which are right and left and look much like automatic screw cutting

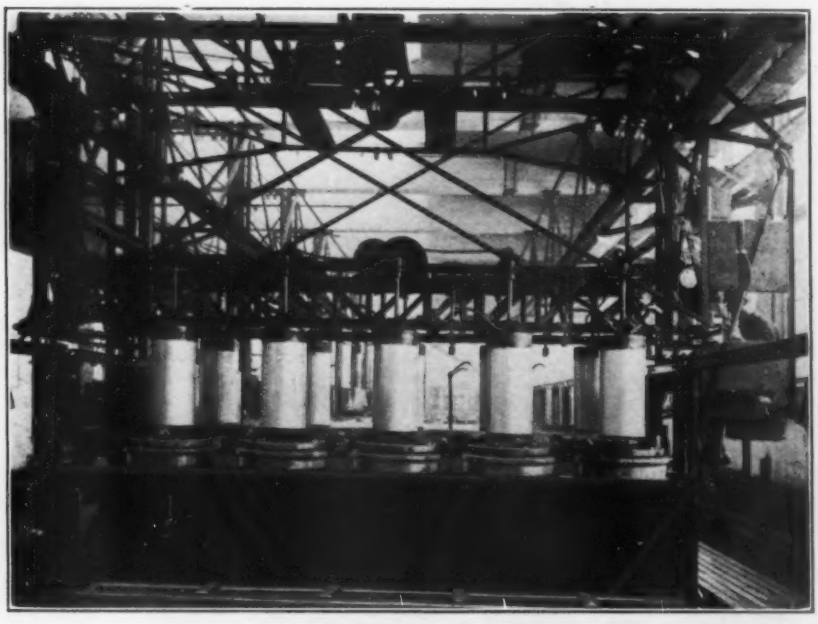


Section of Perforated Steel Ribbon
Used for making tubes for the positive plates

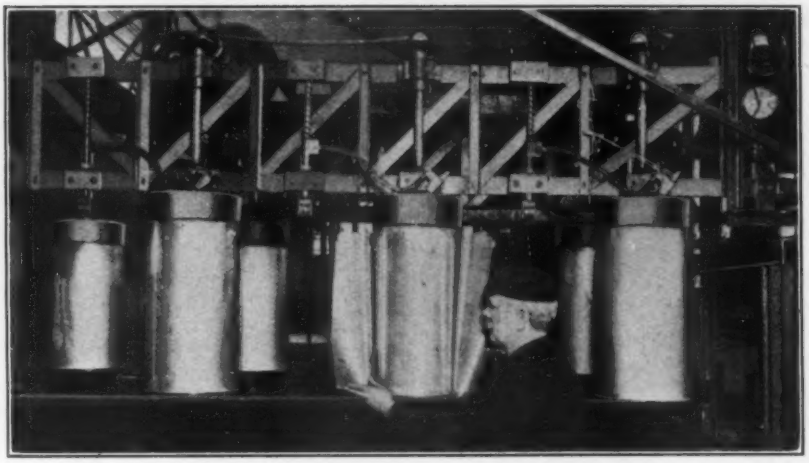
machines. The tubes are wound in a right hand direction and also in a left hand direction. This may seem like an unimportant detail. Nevertheless its importance is sufficient to necessitate the making of two distinct machines. The right hand and left hand tubes are placed side by side in the finished positive plate, a right being placed next to a left, and so on alternating, thus preventing their bulging or swelling in any one direction, in fact a special inspection is given to see that no two adjacent tubes are wound in the same direction.

The actual winding is done by passing the ribbon between sets of wheels which flange the unperforated edge of the ribbon, and as same is wound upon a rod or mandrel, these flanged edges where they interlock are bent down, and the joint passing between swedging rollers is firmly locked so that the tube cannot be unfastened when once it has been rolled together. As the finished tube passes out at the end of the machine, a high speed rotary metal saw cuts the tube off into proper lengths. The making of the positive tube requires some seventeen distinct operations, and after each the tube is inspected. This painstaking method of inspecting each and every part and process is responsible for the very small percentage of batteries which prove in any way defective when they reach the final testing room.

After the tubes are assembled in vertical rows in the positive plate frame, this is placed in a press which clamps integral metal clips of the frame over the chisel-like ends of the tubes holding them firmly in position so they cannot shift, thus the complete positive plate appears as in the accompanying figure. No sediment can drop down from this plate, and this difficulty does not have to be provided for in the Edison battery, the bottom of the plates in the finished battery being only about ¼ in. from the bottom of the can or container.



Machines Which Manufacture Flake Nickel



Close View of Machines for Making Flake Nickel
Showing how the sheet of alternate layers of copper and nickel is peeled off of the drum

Ingenious Process Producing Flake Nickel

The reader has now seen the construction of the completed positive plate, but nothing has been said of the unique process by which pure flake nickel has been obtained. This is one of the picture processes of the plant, and is well worth our closest attention. We pass then into a long room with large overhead apparatus, and there suspended from an overhead crane, operated by a boy traveling with it, is a series of ten polished spools about 20 in. in diameter, by 40 in. in length. These are all revolving on vertical axes, motion being imparted to them by a small motor travelling with the crane. The spools or drums are of polished brass. After washing they are lowered into a copper-plating solution, for the space of half a minute. When raised, they are seen to be brightly copper-plated. After again being washed they are lowered into the nickel-plating bath, where they remain for about a minute and a half. This is continued until alternate coats to the number of 250 have been deposited.

Ancient and Modern Methods

The time in the nickel is regulated by a circuit breaker set to throw out when sufficient current has passed to deposit a coating of about 1-25,000 in. in thickness, this being as accurate as any known method of determining how long the spools should remain in the solution. It is interesting to note that at this point, directly beside this most modern method of determining the length of time the spools remain in the solution, is also used one of the most ancient of timing methods known to the world, namely the hour glass. The length of time required to give the copper coating is approximately one-half minute, its exactness is unimportant, and the process is timed by a small frame in front of the operator upon which are mounted two hour glasses at right angles to each other. When the spools are dipped, the frame is flopped over and they are held until the hour glass ceases to run; thus are used in the manufacture of the most modern battery both the most ancient and the most modern methods.

The 250 coats are approximately 1-64 in. in total thickness. By passing a knife down the side this sheet of alternate layers of copper and nickel is peeled off of the drum. It is then passed into a machine which chops the sheet into small squares of but 1-16 in. on each edge. These squares are then placed into a heated solution which is continually agitated. This secret solution completely dissolves out the copper, leaving for each 1-16 in. square 125 squares of pure metallic nickel of approximately 1-25,000 in. in thickness each. This mass is continually agitated, the copper solution drawn off, and the contents of the barrels placed in a centrifugal washing machine, where by successive washings the metallic nickel is freed of all copper solution. It is then placed in pans and dried. The resulting metallic flake nickel resembles the artificial snow or mica used under Christmas trees more than anything else, and is so fine that it is almost impalpable, sticks to the fingers like gold leaf.

This mass is then passed through a continually agitated sieve of twelve mesh, falling on to another of thirty-two mesh. What passes through the latter is rejected, but that dropping between the two is suitable for use and forms the metallic nickel, which is fed into the tube filling machine, into the positive tubes, thus separating the layers of nickel hydrate.

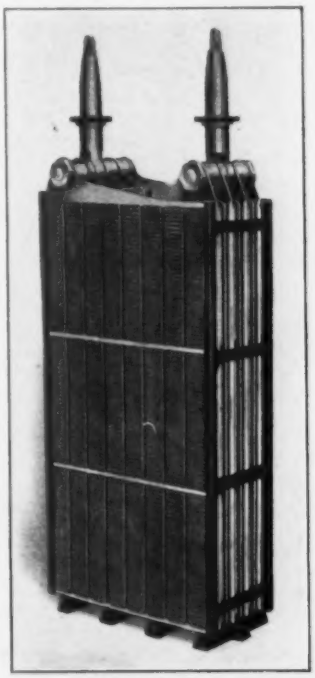
Making the Negative Plate

The negative plate is very much more simple in its construction and does not offer so many difficult problems. The so-called pockets which hold the negative material, black iron oxide, are made by using two pieces of the perforated steel ribbon flanged at the sides, and forming a little box or container. These are filled from the open end and tamped down compactly in a somewhat similar manner to the filling of the positive tubes, after which the ends are folded over, closing the pocket. These are then passed through a machine which slightly grooves the longer edges so that they fit into the frame which forms the negative plate. They are then passed under a press which corrugates the sides of thepockets, the slight bulges at the end of the corrugations preventing them from dropping out of the grid. Twenty-four of these in three rows of eight each are forced permanently into place by hydraulic pressure and form a negative plate.

Assembling the Battery

All that now remains is to assemble the positive and negative plates within the nickeled steel container or can. This is done by simply mounting the positive plates on a steel rod, the plates being spaced equally distant by steel washers. The same is done with the negative plates, and the two sets are then sandwiched together. In the type A-4 there are four positive and five negative plates, as shown in the accompanying illustration. To prevent the plates from touching each other or the can, a latticed hard rubber support is placed in the bottom, and small hard rubber rods are placed vertically between the plates in the grooves formed by the vertical tubes of the positive plates. On the ends a ladder-like cutout of rubber is placed and on the sides a thin sheet, completely insulating the inner parts from the can. The ladder-like end insulators are grooved, positioning the positive and negative plates, and effectually preventing the ends which are not supported from touching each other. The can into which the combination of nested plates is then assembled is also of nickeled sheet steel with corrugated sides, providing strength, with the top welded in position. This is done in a special machine by the oxy-acetylene process, it being very evident from the welding on of the top that the makers of the Edison Storage Battery do not expect that it will ever be necessary to remove the plates, as the welding process makes the can a complete integral unit which it is impossible to open. Protruding through the top and surrounded by hard rubber washers are the two tapered terminal pieces, and between them is the filler cap through which the solution of potash and distilled water is introduced. This top cap forms a small automatic relief valve, which allows gases to pass out, but closes instantly that air or anything attempts to pass in. The pole pieces are connected by solid copper terminals, nickel-plated. These fit over the tapered ends, and are securely held in place by nuts, there being no necessity for lead burning in connection with the Edison battery.

One of the Tubes of the Positive Plate

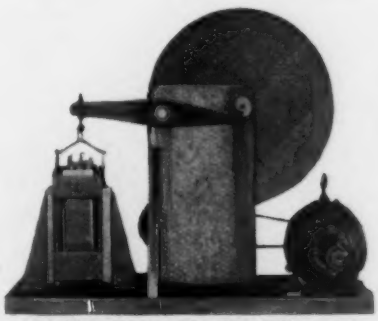


An Assembled Cell
Consisting of four positive and five negative cells

All Parts of Steel Heavily Nickeled

The method of nickel-plating the steel parts which enter into the construction of this battery is also a noteworthy process. Each part is placed after nickeling in hermetically sealed retorts and heated. During the time that the parts are being heated to the proper temperature, hydrogen gas is fed through this, effectually preventing the oxidizing of the surface and causing the nickel to enter into the surface of the steel, so that peeling off of the nickel in thin sheets, as is often the case with nickel-plating of the ordinary kind, is an unknown thing after this treatment. The cells are grouped together in wooden trays fitted with metal cradles for holding them, and metal clamps hold them rigidly in place. Every battery is then tested by charging it and discharging it completely three times, voltage readings being taken of each individual cell at every charge and discharge.

The ability of the Edison battery to withstand shock and jar was fully demonstrated by Mr. Edison before he ever started to build a factory. In the accompanying photograph is shown the machine which he devised, and in which the cells were tested after two million falls from a height of ½ in. onto a solid oak base. Having withstood



Machine Devised by Mr. Edison for Testing His Battery

Hand Truck Used to Subject to Butting Test

successfully this tremendous test by showing that their capacity was up to the standard and no sediment in the bottom of the cells, Mr. Edison gave the following instructions: "Mount six of these cells in a tray, secure tray to a hand truck longitudinally, and project truck against a brick or stone abutment five hundred times at a speed of 15 m.p.h. at the moment of impact." This was literally carried out. He then said: "Place tray of cells laterally on truck, and repeat performance." Then, and not until then, did Mr. Edison conclude that the battery was ready to be placed in the hands of the average truck user and driver. Nor did he start to lay the foundations of the factory until this test was successfully withstood by the Edison battery.

THE COMMERCIAL ELECTRIC CYCLECAR

This very novel rig for light parcel delivery is designed by O. E. Huebner, 131 Sumpter Street, Brooklyn, N. Y. It is a three-wheel affair, with drive and steer by the single front wheel, which is solid rubber tired. The two rear wheels may be fitted with solid rubber or steel tires. No differential is used and the rear axle is dead.

Battery is optional, either twelve-cell lead or fifteen-cell Edison. Mileage on a charge is 35 to 40 on a hard level road, and the speed is 10 m.p.h. The controller gives three speeds forward and one reverse. Motor is .7 h.p. by brake test.

Frame is pressed steel. Front wheel is 18 in. and the rear 28 in. in diameter. Brakes are double external. Springs are triple and double acting.

Wheelbase is 72 in. and tread 56. Body is optional; closed stake, or special. Loading space is 48 in. long, 46 in. wide, and 42 in. high. The approximate extreme width is 60 in., and approximate extreme length 108 in. with tailgate closed. Ground clearance is 7 in. Lamps are electric and signal electric horn or bell. The car weighs 900 lbs. and has a capacity of 300 lbs. excluding driver. It sells at $500.

DECEMBER MEETING OF ELECTRIC VEHICLE ASSOCIATION OF AMERICA

At a well-attended meeting of the E. V. A. in the auditorium of the United Electric Light & Power Company, at 654 W. 187th Street, New York City, December 16th, the members reviewed and discussed the papers which were delivered at the Chicago Convention of the Association.

Preceding the session a tour of inspection of the new sub-station was made, and following the discussion a collation was served.

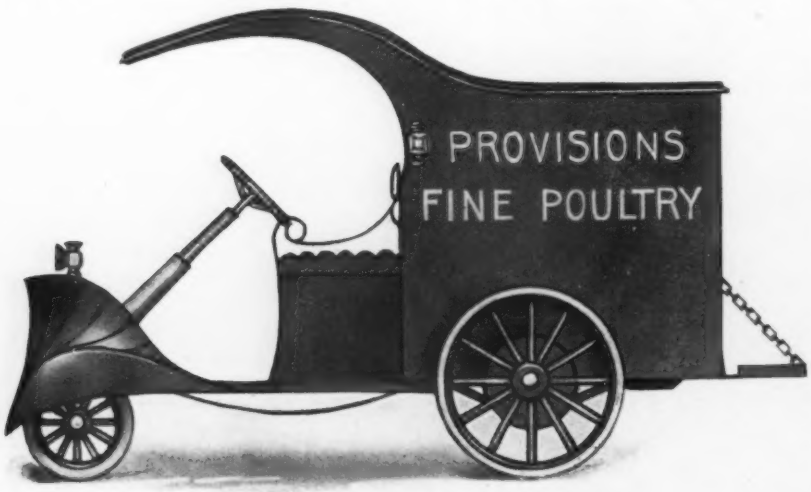
This was the second monthly meeting of the E. V. A., and President Smith announced that the association would soon have a permanent secretary and also permanent headquarters. Secretary Harvey Robinson reviewed the past year's work.

There are now sections of the E. V. A. in New York, Boston, Philadelphia and Chicago, and plans are under way for the formation of a Pacific Coast section. One year ago but twenty car makers were represented; now there are thirty-seven electric vehicle makers on the roll.

Abstracts of the Chicago papers were read and briefly discussed. The paper on salesmanship, which was extracted by Mr. Kennedy, caused considerable discussion, as did also Mr. Pratt's paper, extracted by Curtis, the latter bringing out some pertinent facts in regard to proposed methods of handling freight in and around New York, and of the large freight terminal which has been proposed for the meadows of Jersey. Day Baker spoke of the good work of the Boston Branch.

The meeting was well attended, and all appeared enthusiastic as to the present status and future of the electric vehicle, both in pleasure and commercial lines.

Splitdorf Electrical Company, Newark, N. J., has effected a working arrangement with the Apple Electric Company, Dayton, Ohio, whereby the Aplco lighting system will be sold and installed at all Splitdorf branches and service stations.



Side View of the Commercial Electric Cyclecar

Solid rubber tire in front and rubber or steel tires in rear. Capacity, three hundred pounds. Price, $500

E. V. A. PHILADELPHIA BRANCH ORGANIZED

On December 15th a group of those interested met at the Philadelphia Electric Company's rooms, Chestnut Street, Philadelphia, and organized the Philadelphia branch of the Electric Vehicle Association of America. The following officers were elected: R. L. Lloyd, Chairman; A. W. Young, Vice-Chairman; J. C. Bartlett, Secretary-Treasurer; Executive Committee, Walter H. Johnson, Frederick B. Neely, James M. Skinner, Carroll A. Haines, E. R. Whitney. One of the first steps taken by this branch is to increase the number of charging stations in and around Philadelphia, and to keep the cost per kilowatt for charging at the lowest possible figure.

BIG ELECTRIC ORDER

The Baker Motor Vehicle Company, of Cleveland, manufacturers of Baker Electrics, have just reported the sale of twenty-five trucks ranging from 1000 lbs. to 4 tons, to The Delivery Company of Cleveland. This is the largest single order ever placed by a Delivery Company.

During the month of November, which is the first month the Delivery Company has operated, these trucks averaged 41 miles per day and carried an average of 181 packages per car per day. At this rate these trucks will carry over 1,500,000 packages during 1914.

About half of the trucks are rented on a yearly basis to Cleveland concerns for their exclusive use. Such companies have no expense whatever in connection with the continuous daily guaranteed operation of the trucks, other than the contract rental charge based on the size of truck. Others are operated by The Delivery Company for delivering packages in varying quantities for a number of Cleveland companies on a per package basis, depending upon the distance the package has to be hauled.

At the present time The Delivery Company is handling the retail delivery of 175 Cleveland merchants. The total number of Cleveland merchants who are now either renting or operating Baker Electric trucks numbers more than 200.

The Delivery Company will occupy its own building about February 1st, the size of which will be 100x140 ft. and will be one of the largest garages in this city. It will have accommodations for seventy-five trucks and the Delivery Company is planning to operate at least seventy-five Baker Electric trucks before the end of 1914. Three gas cars are also used for hauling merchandise to distant points in the suburbs.

The organization of this Company is typical of what will probably take place in the near future in many other cities. When we consider the 228 cities in this country having a population of 25,000 or over, in every one of which there is much delivering to be done, and in which the delivering is being done by horse delivery systems or unsatisfactory motor trucks, we can readily understand the splendid opportunity there will be for an efficient system similar to this one started in Cleveland.

The Baker Motor Vehicle Company are to be congratulated upon the showing which they are making in the development of the electric truck business.

Kerosene and the Commercial Car

Some British Experiences With Heavy Fuels

By OUR FOREIGN CORRESPONDENT

The Disadvantages of Kerosene

THE amount of attention given in Great Britain to the possibilities of using kerosene as a fuel has in the past varied directly with the price of gasoline. Some years ago when the price was fairly high, a certain amount of tentative work with kerosene was carried out. Later the price of gasoline went down, and when this occurred, interest in the heavier fuel waned. Even at this time kerosene was, of course, much the cheaper fuel, and consequently it is clear that the difficulties attending its use had not then been overcome to any appreciable degree. Among the principal difficulties are the trouble of starting up with a cold engine; the tendency to emit clouds of smoke after running slowly for a little time; the mechanical troubles resulting from kerosene getting mixed with the lubricating oil of the engine; the sooting up of plugs and piston heads; a certain sluggishness in the behavior of the engine; and a tendency towards uncertain and irregular running.

Purely a Financial Question

The marked increase in the price of gasoline has again led to experiment and trial with the heavier and cheaper fuel, but even now, though these experiments can be carried out in the light of increased knowledge of carburetor design, they are still largely tentative, and no agreement has been reached as to the best solution of the problem.

The Public Don't Know!

One of the largest firms of carriers in London, employing well over a hundred petrol trucks, are using kerosene on all their internal combustion driven machines —chiefly of Thornycroft make—with excellent results from a financial point of view; indeed, the annual saving represents a very considerable sum. For their purposes, they use the G. C. vaporizer, an apparatus capable of dealing with heavy oils, kerosene, or mixtures of kerosene and benzol, and already illustrated and described in the COMMERCIAL CAR JOURNAL. Fitted with these appliances their vehicles run on a heavy kerosene oil, costing, I believe, about 11 cents to the gallon when bought in the bulk that they require, and but little or no inconvenience arises from smell or smoke. In fact, the public are wholly unaware that these machines are being run on kerosene.

A well-known consulting engineer has reported on the G. C. vaporizer—the rights for which in the United States are controlled by the G. C. Vaporizer Company of America, Inc., 1790 Broadway, New York City—to the effect that a comparative test on a 30-h.p. Aster engine demonstrated that the consumption on full load is the same with kerosene as with gasoline, and that kerosene has a slight advantage in consumption at partial loads, owing to more perfect carburetion with the G. C. apparatus. Flexibility and acceleration were both satisfactory, and there was no evidence of any carbon or greasy deposit in the engine. A road test carried out by the same engineer gave similar results.

What a Driver Finds

A driver of a five-ton truck fitted with a G. C. vaporizer recently stated as his experience that he found an increase in power and a rather better mileage than he got when using gasoline. After six months' hard wear he took down the cylinders and found everything satisfactory, and only a thin layer of brown soot, upon the piston heads that could be rubbed off with the fingers. When the carburetor was adjusted to give a rich mixture it led to rapid sooting up of the sparking plugs. His engine is generally run for about five minutes on gasoline when starting up from cold, and after making deliveries of goods it can be started up again easily on kerosene if the truck has only been standing for a few minutes. There is some smoke when the car is stopped or the engine throttled down, and in heavy traffic where frequent stops occur the driver changes over to gasoline. These statements are based on experience with 1700 gallons of kerosene used at the rate of about one gallon to six miles in fairly hilly districts. The cost of the kerosene has averaged 14 cents per gallon as against gasoline at about 27 cents.

Experience of a Big Brewing Firm

Detailed particulars of results obtained with kerosene have been furnished to the writer by Messrs. William Hancock & Company, Ltd., of the Brewery, Cardiff, to whom the writer would here like to make acknowledgments of their courtesy, and the following table gives the results of a week's working of a three-ton Albion truck running on kerosene.

	Journeys	Miles	Gasoline used	Kerosene used	M.P.G.
April 1,	Newport	24	1 pint	4¾ gal.	5.0
" 1.	Pontycymmer	60	½ gal.	12 "	4.8
" 2.	Newport	24	½ "	4½ "	5.0
" 2.	Wattstown and Mardy	48	¼ "	9½ "	4.9
" 3.	Newport	24	¼ "	5 "	4.6
" 3.	Porthcawl	52	¾ "	10 "	4.9
" 4.	Cadoxton (2)	16	¼ "	3½ "	4.3
" 4.	Pentre	44	½ "	8 "	5.2
" 5.	Wick	40	½ "	9 "	4.2
" 7.	Barry	20	¼ "	4 "	4.7
" 7.	Porthcawl	52	½ "	9½ "	5.2
		404	4¾ gal.	79¾ gal.	Av. 4.8

Gasoline gives a better consumption of 6 miles to the gallon, which, for the 404 miles covered in the above six days working, would involve 67¾ gallons of spirit. The costs work out as follows:

79¾ gal. of kerosene at 12 cts. a gal.	$9.57
4¾ gal. of gasoline at 27 cts. a gal.	1.15
Total	$10.72

Running on gasoline, the cost over the same mileage would work out to $18.30, showing a saving of $7.58 on a week's running with kerosene.

This brewery uses a kerosene carburetor known as the "Notax" made by a Cardiff firm, and they inform me that they have had no trouble from condensation of the kerosene working down to the big ends, or from pre-ignition. Nor is there any deposit more than would occur in using gasoline. To adapt the engine for the change of fuel, they have merely inserted plates under the cylinders to reduce the compression, and of course, increased the valve tappets accordingly.

Net Results of Some Bench Tests

The Notax apparatus has been subjected to careful tests by the Daimler Motor Company, of Coventry. The carburetor was fitted to a four-cylinder engine having cylinder dimensions of 110 x 150 mm. The best result obtained on the road was a gross ton-mileage of 54 per gallon. Another test gave a gross ton mileage of 49.5 per gallon. In this case, the exhaust was somewhat smoky, and in both instances the weather

was fine, the roads dry, and the total weight of lorry and load 6 tons. From these results it appears that the highest efficiency and the absence of smoke are to some slight extent dependent on the driver's prior knowledge of the road to be covered In a complete series of bench tests it was ascertained that the power given by the engine at 1000 r.p.m was 13.2 h.p. At lower speeds good results were obtained, namely, 17.12 b.h.p. at 500 r.p.m. and 13.4 b.h.p. at 400 r.p.m. During these experiments no use was made of the variable jet which, if employed, might have resulted in slightly improved consumption. No alteration was made in the compression of the engine as designed for gasoline fuel, and consequently it is not surprising that at low speeds the engine knocked and the exhaust was somewhat smoky. During the bench tests restarting on paraffin was found to be difficult after a stop of more than about three minutes.

The Stewart-Morris kerosene vaporizer is another appliance that has already been illustrated and described in these pages. Fitted to a Pathfinder car weighing, when loaded, 3692 lbs. and having a four-cylinder engine of 105 m.m. bore x 133 m.m stroke, one of these on a Royal Automobile Club test of 69.7 miles showed a consumption of one gallon to 11.487 miles or 18.95 ton-miles to the gallon. The cubical contents of each cylinder compression space, be it added, was 368 c.c., and the volume sweep by the pistons 1152 c.c., giving a compression ratio of 4.19. During the run there were sixty-four traffic stops, involving the engine being kept running with the vehicle standing for twenty-eight minutes, forty-six seconds.

Two-Fuel Carburetors

In some instances carburetors are now designed with a view only to the partial employment of kerosene used always in conjunction with a certain quantity of gasoline. One device of this kind which has just recently been put on the market in an improved form is the Hamilton Bi-Fuel carburetor, which contains two separate float chambers and two mixing chambers. When starting, the throttle is placed in the position which allows only the lighter fuel to feed the engine, but later it is adjusted so that any proportion up to about 80 per cent. of the heavier fuel may be employed.

Similar in object is the Kelloway Bi-Fuel carburetor, the essential feature of which is a fuel valve having upon it helical grooves, which have a spreading action upon the fuel as it is drawn through by the pulsations of the engine. Road tests have been carried out with this carburetor, which have served to show that kerosene alone can be used when the engine is hot, without any carburetor adjustment. Quantitative tests are not at present available.

Two of a Fleet of Ten Three-Ton Albion Trucks Supplied for Government Service in Uganda, and Running on Kerosene

More Results by Users

The writer has been favored with a series of very interesting results obtained by Mr. A. H. Curtis, the manager of Fremlin Bros., a well-known firm of brewers of Tottenham, London. This firm has employed a five-ton Dennis truck, fitted with a White & Poppe kerosene carburetor in addition to the ordinary gasoline carburetor, the two being entirely independent. During 65 days running the truck covered 5236 miles, taking out an average load of 8300 lbs. The total quantity of goods handled was 270 tons of full goods, and about 180 tons of empties. The total amount of fuel used was 198½ gallons of gasoline and 591 gallons of kerosene—that is to say, kerosene represented 75 per cent of the total. The engine has not yet been taken down for examination, from which it is safe to assume that no obvious mechanical troubles have followed on the use of kerosene. Gasoline has been used mainly for starting up and for running until the engine is warm; afterwards kerosene is used whether the weather be hot or cold. Mr. Curtis anticipates using a larger percentage of kerosene in the future, as the new driver in charge of the truck has hitherto been specially careful not to change too soon from gasoline. On one occasion the change was made too early, the effect of this being that the kerosene reaches the engine in too liquid a state, refuses to burn properly, and gets down past the piston, mixing with the engine oil in the crankcase, and spoiling it as a lubricant. The same result occurs unless great care is taken to keep the ignition of every cylinder in perfect order, for if one cylinder is not firing, the kerosene condenses and runs down. The engine gets hotter with kerosene than with gasoline, which entails changing down to a lower gear rather earlier, and it is found desirable to keep the ignition more retarded than with gasoline. The figures given above show that the total fuel consumption was approximately 790 gallons for 5236 miles, or approximately 6.63 miles to the gallon. Messrs. Fremlin Bros. have run a similar Dennis lorry with a White & Poppe gasoline carburetor for 2989 miles, on 485 gallons of gasoline. The average load carried has been rather smaller than in the previous instance, but it will be observed that the fuel consumption is at the rate of 6.16 miles per gallon, the kerosene showing a marked advantage in this respect. The method of fitting the kerosene carburetor to a Dennis chassis is shown in the accompanying illustration. Messrs. White & Poppe maintain that it is advisable to use a single jet of appreciable size for kerosene, owing to the amount of foreign matter commonly present in the oil. They also urge strongly the advisability of employing two separate carburetors, for various reasons, one being that the proper size of jet required to give the best running with each of the two fuels is not in all cases the same. Moreover, they

An Eleven Hundred Gallon Street-Watering and Flushing Commer Car, Fitted With the Southey Oil Gas Producer

A 38 h.p. Five-Ton Lacre Kerosene Truck Operated by the Midland Railway Company, England

consider that for long runs under light load at a low pace, as for example, in congested traffic, it is advisable to run either on gasoline alone, or on the two fuels mixed after reaching the engine. The vaporizer of their kerosene carburetor consists of a very thick copper tube running through an enlarged exhaust pipe, and arranged so that the flame from the exhaust of the engine plays directly upon the tube. They have supplied kerosene carburetors with satisfactory results for rail work, and for use on tram cars, commercial cars and road rollers.

Diluted Lubricant

In detailing Messrs. Fremlin's results we have referred to a trouble which certainly constitutes one of the chief objections to kerosene for the average car engine, however thorough the vaporization of kerosene, in the course of time a certain amount condenses and collects on the cylinder walls, and as time goes on, this works downwards, and finds its way after the all prevading manner of kerosene into the crank case, and as kerosene will wash any oil out of a bearing, so when it gets in the big end bearings, there is trouble; and several users over here have experienced that trouble after about 2 or 3 months working. The car runs very well at first on fuel only 50 per cent. of the price of gasoline, and the user thinks how well rewarded his enterprise will be, but sooner or later, the trouble comes. It really looks as if the car engine would have to be modified somewhat if it is to be adapted to paraffin, but I would like to suggest that such modification is by no means impossible, and would take the form of an arrangement by which the lubrication from the cylinder walls was drained away without ever entering the crank case, at any rate until it has been separated from the kerosene.

"Creeping"

Another difficulty is the apparent capacity of kerosene to penetrate and permeate everything. As a matter of fact, its capabilities in penetrating past joints and so forth are not as great as those of gasoline, but they are far more obvious because the kerosene—unlike the lighter fuel—does not evaporate as fast as it leaks. This is the principal reason why the majority of those who claim to have solved the problem qualify their statement by making it apply to commercial cars rather than to pleasure vehicles.

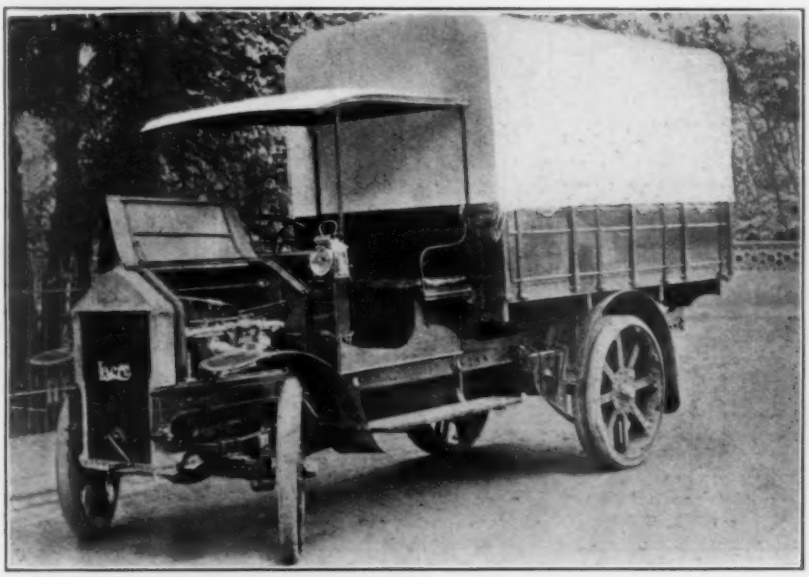
Can Be Used With Unskilled Labor

Kerosene is, of course, extensively used as a fuel for internal combustion marine engines, and in this connection gives satisfactory service. Messrs. Glennifer Motors Ltd., of Paisley, report that the Westmacott kerosene vaporizer as supplied by Messrs. Woodnutt & Company, of the Isle of Wight, gives great satisfaction on fishing boats, which clearly implies that it is capable of working well without skilled attention. The same device is stated by another user to give steady running when the engine speed is slowed down by throttle. Generally speaking, however, marine work does not constitute so difficult a problem as the road vehicle, since changes of engine speed are far less sudden and frequent.

Kerosene for Hot Climates

Among manufacturers of commercial cars, few, if any, can have supplied more vehicles fitted for running on kerosene than the Lacre Motor Car Company. The majority of these cars have, of course, been for overseers' service in countries where higher temperatures make the use of a heavier fuel easier. A government engineer in charge of a considerable fleet of lorries in a British Colony in West Africa has informed the writer that he experiences no difficulties with kerosene, but that he has his engines taken down and cleaned more frequently than he would do with gasoline. In this case, this is not a matter of serious moment, since native labor of a sufficiently intelligent kind is plentiful and cheap. An illustration is given of a Lacre lorry supplied to the Midland Railway Company, of England, and used in the hilly neighborhood of Bath with satisfactory results. The work of this vehicle involves straight runs of 10 or 12 miles before delivery work commences, and this constitutes much more suitable conditions for the use of kerosene than would the work of a delivery van doing a large number of small jobs at short intervals. The experience of the Lacre Motor Car Company leads to the conclusion that there should be a big field for kerosene-driven vehicles even in the temperate climate of the British Isles, provided that the number of stops is not too frequent, and the mileage covered is fairly considerable.

Very prominent among manufacturers who have a large number of vehicles running on kerosene in various parts of the world, but who do not favor this fuel for work in a cold and variable climate, are the Albion Motor Car Company. Considerable number of Albion vehicles have been exported to tropical countries, mainly through the medium of the Crown Agents for the Colonies. For example, the Government of Uganda have ten Albions running satisfactorily on kerosene, two of which are shown in the accompanying illustration. The Crown Agents are contented with a slightly inferior fuel consumption when kerosene is used, and will accept an increase of 10 per cent. to 12½



A 30 h.p. Lacre Colonial Truck Running on Kerosene

per cent. in consumption as compared with that of gasoline. In the case of kerosene-driven trucks to be accepted by them, the consumption must not exceed one gallon to 40 gross ton-miles, while with gasoline the minimum is 45 gross ton-miles per gallon. The Albion patent kerosene carburetor is intended for use in vehicles working under tropical conditions, and the makers do not consider that such a carburetor can be expected to give good results when the climatic conditions are reversed.

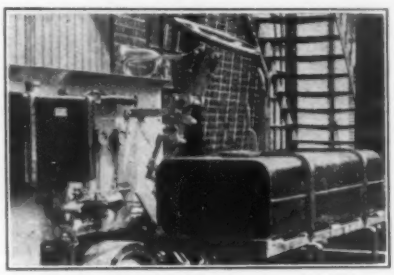
Military Motors and Kerosene—Foreign

When the British War Office first took up the use of automobiles they specified for the first trucks ordered to be fitted with arrangements for using oil of not less than 100 degrees F. flash point, but since then they have discontinued the employment of kerosene or heavy oils. This fact is likely to be misinterpreted by those not knowing the circumstances of the case, but it is only fair to state that their conversion to gasoline is solely because, in the first place they find it does not involve undue risk, and secondly because since they are widening their subsidy arrangements and, as the majority of users upon whom they have to draw for subsidized vehicles employ gasoline, they find it policy to adopt the spirit rather than the oil, since with them the question of cost is not important. When, however, most users are running on kerosene they will certainly be only too pleased to conform to general usage. None the less the British army authorities have done some good work with kerosene with a number of Thornycroft trucks built for them, and still running after six years' rough service.

During the commercial vehicle trials organized by the British Royal Automobile Club in 1907, the fuel question was prominent, and a Thornycroft truck fitted with the special arrangement as supplied by the war office ran through the whole trials without a stop, giving a ton-mile performance at least equal to the best gasoline vehicles—for which a special certificate was awarded by the war office, who ordered further trucks of this make. Many of the Thornycroft vehicles for service abroad, where gasoline is dear and kerosene may be bought at any store, are fitted for using the heavier fuel, and recently a two-tonner fully loaded carrying four passengers, aggregating another ½ ton, was driven without stopping up a hill having a maximum gradient of 1 in 3½. The first time it was driven on benzine, the second on kerosene. In both cases the pulling power was about the same, the only apparent difference being in the note of the exhaust: in both cases with the air supply properly adjusted the exhaust was quite clean, and practically odorless. When tested for fuel consumption on a round trip, this truck ran something over 16 miles to the gallon.

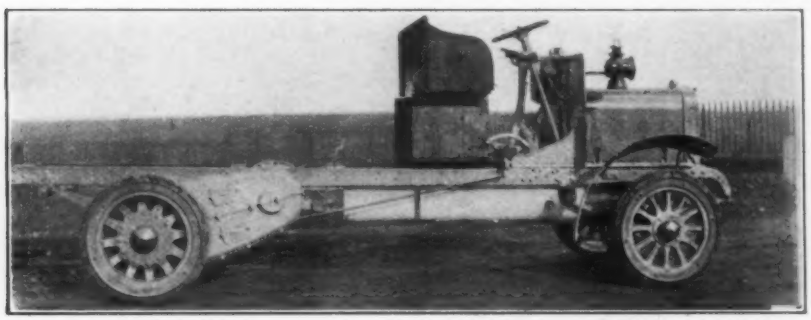
The Gas-Producer Method

Distinct from all other methods, in that the fuel is not merely vaporized, but is converted into a gas, is the Southey oil gas producer, which has already been described



The Arrangement of Kerosene Vaporizer and Fuel Tanks on a Dennis Commercial Truck

in the COMMERCIAL CAR JOURNAL. This device has been the subject of lengthy experiments conducted by its inventor in collaboration with Commercial Cars Ltd. during the last three years. A number of producers were shipped to Ceylon as early as 1910, but were abandoned for the time being owing to the primitive method of starting up when necessary. The same users—The Ceylon Motor Transit Company—are now conducting comparative experiments with two-ton trucks fitted with the Southey oil gas producer and with a gasoline carburetor, but figures of results are not yet available. A considerable number of vehicles fitted with the producer are now going out to the Colonies and elsewhere, the example illustrated herewith being a six-ton (1100 gallons) street-watering and flushing cart for the municipality of Edmonton. The greatest possible confidence is expressed in the future of the Southey oil gas producer by those who have watched its progress. It is stated that the producers now give perfectly successful results on engines up to 25 h. p. and that equal satisfaction on larger engines is only a matter of little time.

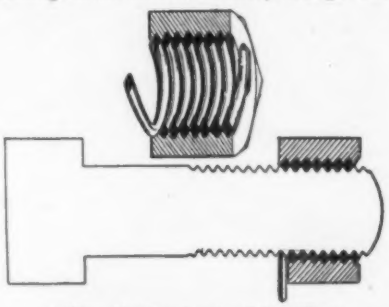


A Commer Car Chassis Fitted to Use Kerosene by Means of the Southey Oil Gas Producer

THE LAST THING IN LOCKING NUTS

By OUR FOREIGN CORRESPONDENT

So many devices for locking nuts and fastenings have been brought out that it might reasonably be thought that all methods of solving the bolt-locking problem had by now been exhausted; yet to us, at any rate, the method adopted in the "Perfloc" nut is new, and it is simplicity itself, the nut being of standard form and thread, but larger in diameter than the bolt it fits—sufficiently so, to allow a coil spring to be embedded in the thread of the nut. This spring is of diamond section, two faces of the diamond embedding in the nut thread, the other two faces actually constituting the working thread of the locking nut complete. One end of the spring is firmly fixed in the top of the nut, while the other is left free, and a slot is cut in the face of the base of the nut, allowing the end of the spring to project slightly beyond one of the faces and to have a certain amount of movement in a circular direction. When the end, therefore, is screwed on to the bolt, the spring locking thread screws on easily enough, but



A New Device for Locking Nuts
Submitted by our Foreign Correspondent

any tendency to turn the nut the other way, whether originating with the working of the nut itself or from other sources, tends to bind the coil thread tightly around the bolt, and the stronger the unlocking effort the stronger the locking tendency. If, however, the projecting lower end of the coil thread is pressed in the same direction as that in which the nut should screw off, this locking tendency is overcome, and the nut can be unscrewed perfectly easily.

But such a device does not entirely rely on sheer resistance to withstand vibration; as a matter of fact, the spring of the coil thread gives it an automatic tendency to tighten itself up against the washer or the part that it is holding in position.

During some tests carried out at the generating station of the London Electric Supply Corporation bolts were subjected to 2800 r.p.m., and while "Perfloc" nuts remained intact after continued application of the test, ordinary nuts were shaken loose after a few minutes' vibration. This was when both sorts of nuts were screwed home equally tightly, but when only screwed halfway down the thread of the bolt, it was found that whereas the ordinary nut rapidly unscrewed itself and finally worked off the bolt, the "Perfloc" nut actually screwed itself on. This is perfectly understandable when it is realized how the spring coil thread is constantly tending to draw it on.

Motor Truck Design and Construction Made Plain

Advantages and Disadvantages of Different Types Discussed

By C. T. SCHAEFER, Member Society Automobile Engineers

This is the fifth installment of a series of articles by this well-known writer, covering in a non-technical way the various constructions now current practice in commercial car design. These articles will take up, in order, the general types of chassis, the advantages and disadvantages of each, illustrated by simple diagrams, and in logical order, motor construction, ignition, carburetion, cooling, lubrication, etc., until each part of the truck has been dealt with.

MOTOR LUBRICATION

PART V.

DEVELOPMENTS in the line of motor lubrication as a matter of course follow on the heels of progress in the art of motor design and construction, for the increase of efficiency which marks the refinement of the motor and its various parts can only be reached if the refinements are paralleled by those essentials which permits the units to perform their required duty. In commercial car motors, the two features, outside of actual mechanical construction and the essential details of ignition and carburetion, which help to the attainment of the highest results with the least expenditure are the cooling and lubricating systems.

The functions of the cooling system are different from those of the lubricating system and will be considered in a separate article following the present one.

All parts which rub together under pressure, such as the pistons moving upward and downward within the cylinders, the connecting rods on the piston and crank pins, the crank shaft in its bearings and all reciprocating and revolving parts must be efficiently lubricated. Whenever two surfaces are in contact and one or other is free to move when a force is applied, there is present a certain amount of friction, which develops instantly when these surfaces are not properly lubricated.

Friction is a resistance to motion of two bodies in contact and is dependent upon certain laws. It will vary in proportion to the pressure applied when the rubbing velocity remains constant. All wearing surfaces, no matter how carefully prepared, are known to consist of minute lumps and hollows. This is true, even of the smoothest surfaces that can be made, although, of course, the height of the depressions and hollows vary with different materials and the finish. The condition of bearing surfaces in an exaggerated degree may be likened to the nap of woolen cloth and the pile of velvet.

When two surfaces are held in contact by an appreciable force these minute parts of the surfaces interlock and resist relative motion. This force is called the force of friction. This fact can easily be demonstrated by placing a book upon a table or smooth board and moving it across the latter, comparing the difference in energy required to move the book across the surface by placing a weight upon it. If this experiment were conducted with two metallic objects and the surfaces were lubricated, considerable less energy would be required.

Friction in reality is heat, which in a short period of time will reach an intense degree and in time the surfaces will be broken down and if the rubbing continues they will be completely destroyed.

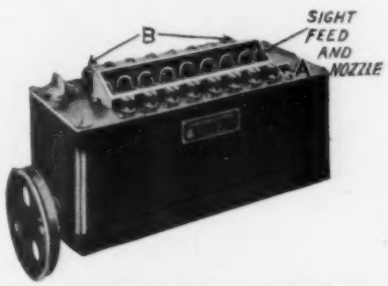


Fig. 1. Exterior View of a Mechanical Oiler

It is driven by belt from the motor, and has individual leads to each cylinder and other parts of the motor.

The action and effect of this friction upon two surfaces not properly lubricated may be explained as follows: At first small particles of metal are torn from the surfaces and these cut and abrade the bearing. As the surfaces continue to roughen, the friction increases enormously until it reaches the fusing point of the metal, when the two surfaces will weld into one solid mass.

A lubricant should possess certain qualities, since its object is to flow between the surface of a bearing, reduce its friction and to radiate a certain amount of heat generated by the bearing. These properties are termed adhesion, cohesion or viscosity, a high flash point and a comparatively low cold test point. It should have considerable adhesion so that the molecules of oil will cling together, considerable cohesion or viscosity, as all bearings are subjected to a pressure, created by the force acting upon them and the effect of this pressure is a tendency to separate these molecules forcing sufficient lubricant out of the bearing to allow the metals to come into contact.

The advantage of a high flash point is that the oil will not give off an inflammable vapor at ordinary temperature, while it should have a low cold test point, so that it will stay in fluid state when cold temperatures are encountered. The high flash point is very desirable; for in lubricating the cylinders, the oil comes in contact with the walls of the combustion chamber and the heat in the cylinder on the power stroke. If the temperature is raised sufficiently to vaporize the oil, the viscosity is entirely overcome and the various residue products of the lubricant are deposited on the walls of the combustion chamber. This residue product is termed carbon and in time will harden, become incandescent and fire the charge prematurely, causing excessive strains on the various parts of the motor. The final result is that the motor will begin to pound, overheat very easily, the valves will pit and the spark plugs become fouled.

The advantage of a low cold test point is that it will flow freely in cold weather preventing the oil leads and pump from clogging up.

There are various methods of lubricating the working parts of commercial car engines, and it is a difficult matter to classify them. We may distinguish, however, between the following: Plain splash; splash from constant level troughs with pump circulation; part force feed and part splash; force feed without splash; either from an external source or built into the motor.

The simple splash system was much used on the earlier models of commercial cars. The crank case contained a supply of oil into which the connecting rods dipped at each revolution of the crank pin, thereby splashing oil over the interior parts. As the oil worked out through the bearings or past the pistons, the oil level in the

crank case fell and the splash became weaker. When the operator considered that the oil level had become too low, he would replenish the supply by either pouring oil into the crank case through a filling hole or transferring it from a supply tank to the crank chamber by means of a hand pump provided for the purpose.

The disadvantages of this system are apparent. The oil level varied constantly and so did the rate of supply to the bearing surfaces. When the crank case was replenished, the oil level was raised considerably and the supply to cylinder walls was generally excessive and the motor, in consequence would pour dense smoke out through the muffler. In order to overcome this feature, some makers, placed baffle plates between the cylinder and the crank case with an opening in the form of a rectangular slot for the connecting rod to pass through. Moreover this system required frequent attention from the operator, and if the latter were careless, the motor could easily be injured through the lack of oil.

Through the deficiencies mentioned above, lubrication by multiple feed mechanical oilers came into vogue. These oilers consisted of an oil reservoir carrying a series of plunger pumps, which forced the oil through individual leads to each part requiring lubrication. Each lead had its own pump, so that the oil was forced to each bearing in proportion to the speed of the motor. While this system was effective, its complications were objectionable. It was difficult to obtain a positive drive and the maze of oil tubes running from the oiler to the engine, rendered access to the latter difficult and presented a frail and non-mechanical appearance. It was also difficult to prevent leaks at the various connections and considerable oil was wasted.

Following this the pump circulating systems were introduced, as it was felt that a simpler system was needed and one that was at the same time thoroughly automatic. The gear and plunger types of oil pump are most popular; however in some cases vane pumps are also used.

The gear pump consists of a casing in which fit snugly two spur gears, one driven by means of its shaft and gears from the cam shaft and the other by meshing with the former. The oil enters the housing on the side on which the meshing teeth separate and fills the spaces between adjacent teeth and the wall of the housing. It is thus carried around to the opposite side of the housing and leaves through an opening there.

Plunger pumps are generally placed inside the crank case and driven by eccentrics from the cam shaft. They consist of a brass barrel set in the case and carrying a plunger, which is held in contact with he eccentric by a spring. Below the spring a ball valve is placed. As the plunger moves upward, the lower end of the barrel increases in volume and oil enters through the ball valve. When the plunger is next moved down by the eccentric, the ball valve closes and oil is forced up through and out another ball valve, which remains closed on the upward stroke of the plunger.

In what follows the writer will attempt to describe and illustrate the most popular systems in use at present, among which both the gear and plunger types of pumps will be found.

Figure 1, shows a mechanical oiler which operates in the following manner. A series of double plunger valveless pumps are driven by belt from a cross shaft which is driven by the engine. One set of plunger pumps lift oil from the reservoir and discharge it from the nozzles in the sight feed compartment. The amount of oil discharged being regulated by the adjusting screws "A," directly in front of the sight feed. The other set of plungers take oil from the sight feed compartment and deliver it to the various parts of the engine through the oil lead connected with the pump outlets "B." The plungers work alternately and each acts on a check valve for the other.

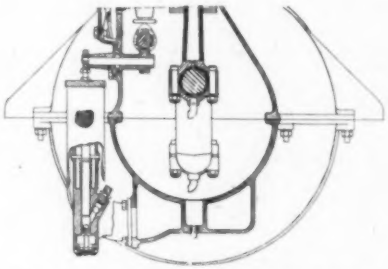


Fig. 2. Sectional View of Non-circulating Splash System

The cross shaft engages the cam shaft through spiral gears and operates the piston plunger by means of a cam on its other end.

Figure 2 illustrates a splash system of the non-circulating type incorporating a plunger pump mounted on the lower half of the case near the fly wheel end and driven by spiral gears from the cam shaft and an eccentric operating on the top of the pump plunger. Into the plunger of this pump is inserted a hardened steel screw, locked by a check nut, which serves as an adjustment for the stroke of the plunger and a regulator of the quantity of oil delivered to the crank case.

The connecting rods are provided with dippers which are hollow and permit a certain amount of oil to reach the connecting rod bearings during each revolution of the crank pin. They also splash oil over the interior parts of the motor, the crank and cam shaft bearing housings being provided with pockets which store the oil and feed it to the bearings as it is needed. Each connecting rod has a separate trough into which it dips, and the two forward ones are separated from the rear by a high partition, so that a positive oil level can be maintained for all conditions, when traveling up or down grade. While the oil is not recirculated, there is always a fresh supply added to the troughs, as it is being consumed by the motor. Each trough is also provided with a separate drain so that the sediment may be removed at intervals.

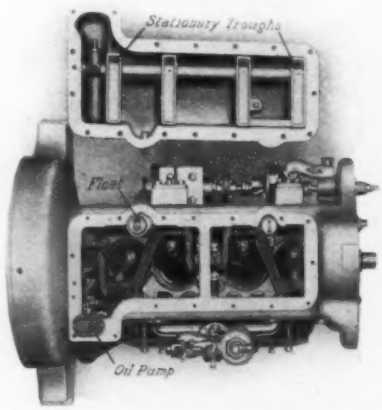


Fig. 3. Base Removed on Constant-Level Splash-Lubricated Motor

The gear pump delivers oil to the stationary troughs, into which the connecting rods dip and splash oil to the other parts.

Figure 3 shows a constant level splash system of the recirculating type. The operation of the system is similar to the one explained above, oil being supplied to the stationary troughs by a gear pump. Scoops on the connecting rods dip into these troughs and cause the oil to splash onto the pistons and into the small reservoirs which lead to the various bearings. The surplus oil drains back to the main reservoir, when it is thoroughly strained and again recirculated. Some manufacturers use two plunger pumps, driven from cam shaft eccentrics.

Figure 5 illustrates a gravity-feed system using a gear pump for supplying oil to the gravity tank from the reservoir in the lower half of the case. This gravity tank is placed at the top level of the cylinders and has an oil lead of large diameter to each of the main bearings and the timing-gear compartment. The delivery pipe and leads are provided with strainers, so that the oil is thoroughly strained before being recirculated. The crank shaft journals and short arms are drilled through, so that the oil can pass from the main bearings to the connecting rods, centrifugal force being relied on to carry this oil to the connecting rods. Part of this oil works through these bearings and creates a spray, as in the force-feed system. This spray lubricates all other moving parts. It will be noted that the shape of the oil tank is such that when the car is moving up or down grade all bearings will receive an equal amount of oil. An oil gage on the dash shows the amount of oil in the tank, indicating that the pump is doing its work.

Figure 6 is a sectional view of a force feed system of lubrication built into the motor. Oil is carried in a reservoir bolted to the crank case and is circulated by a gear pump attached to the reservoir. This pump forces oil up through a lead to the distributor pipe, both being connected with a pressure relief and adjusting valve. This distributor pipe has branches which communicate with the main bearings and the timing gear compartment. From the main bearings the oil is forced through a hollow crank shaft to the connecting rod bearings. The connecting rods have tubes inserted in them so that the oil can also be forced up to the piston pin bearings. A certain portion of the oil works out from the connecting rod bearings, is thrown off as the crank shaft revolves and forms a fine spray which lubricates the cylinders and the interior parts of the motor, the excess oil being returned to the reservoir. The main oil lead between the pump and the distributor pipe has a branch which is connected

to a pressure gage located on the dashboard, registering the pressure of the oil under all conditions. This pressure may vary between two and ten pounds depending upon the speed of the motor. Should the pressure in the system exceed a certain predetermined amount, the relief valve will open, permitting the excess oil to return to the reservoir for recirculation. This relief valve is provided with an adjustment so that the pressure may be increased or decreased as conditions demand.

The constant level splash and force feed systems are the most popular, and, as positive driven pumps are resorted to, to feed the oil, the general tendency is to provide oil leads of a large diameter and to reduce the number of bends to a minimum. Whenever bends are necessary they should be made as large as possible to reduce the obstructions and resistance.

From the above it can readily be understood that the writer considers the constant level splash recirculating system the simplest in use at present. Its operation is mechanical and the attention required is reduced to a minimum, while at the same time it is quite economical on oil.

The advantages of the force feed system are that the oil may be forced to the bearings under considerable pressure, reducing the danger of the oil being forced out by the bearing pressure. It is generally agreed that with force-feed the specific pressure on the bearing can be increased and that the bearing will last longer. While on the other hand the writer finds that this system is more expensive to install and less economical of oil. It would appear to be better adapted to commercial car engines which operate at or near their full load for a considerable length of time.

In the gravity feed system the oil leads must be carried on the outside of the motor which presents some complications as they will require attention at intervals. The economy is possibly on a par with the constant level splash system. Mechanical oilers are very rarely used on the heavier types of commercial cars, being mostly found on the light popular priced models.

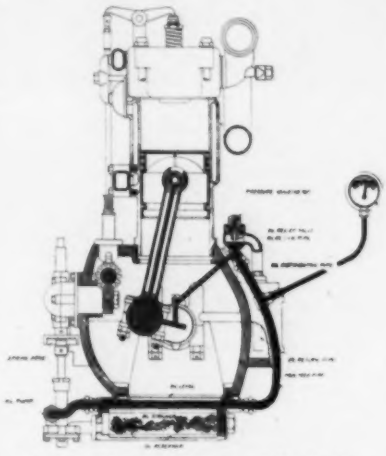


Fig. 5. Sectional View of Built-In Force-Feed System

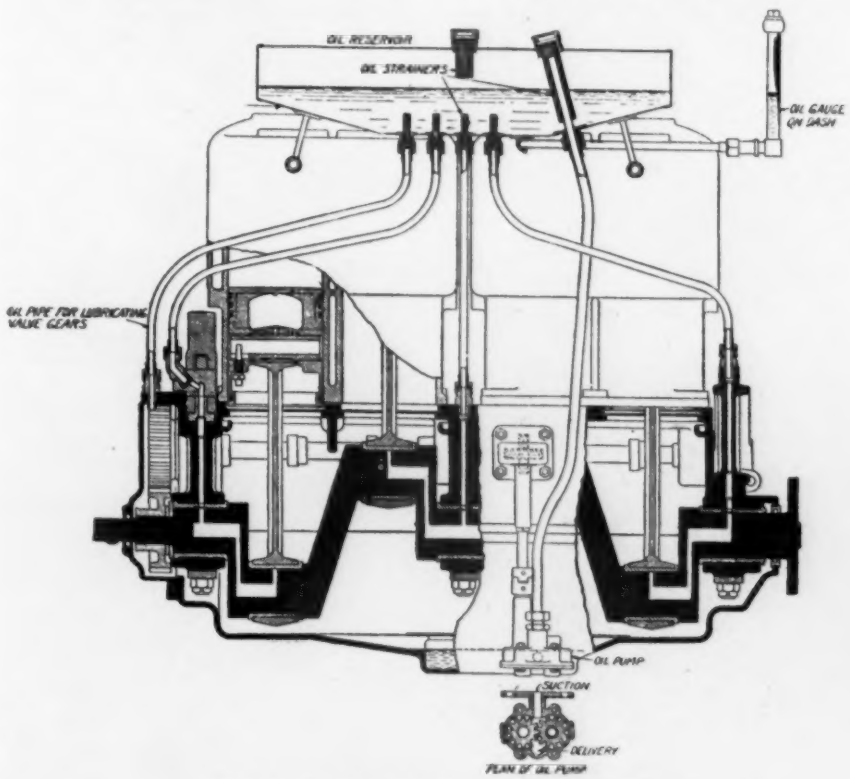


Fig. 4. Combination Pump and Gravity System

Gear pump supplies oil to the gravity tank on top, from which it is fed by gravity to the main bearings and timing-gear compartment. Hollow crank shaft allows the oil to get to the connecting-rod bearings.

EFFECT OF OVERLOADING SOLID TIRE

Many motor truck owners have the idea that there is no limit to the ability of a solid tire to bear loads and so pile their cars high with "cargo" without any regard for their tires. Solid tires however, are as sensitive to overloading as pneumatics and R. G. Harris, head of the Motor Tire Department of the Firestone Tire & Rubber Company in the following sounds a warning of that tire abuse.

"The immediate result of overloading a solid tire is the appearance of a bulge, called a 'traction wave,' in the rubber just in front of the point of contact between tire and street. This wave with the enormous weight back of it, works through to the very base of the tire.

"No tires are made of pure rubber. The gum must be compounded with chemicals to give the desired wear resisting qualities. The traction wave lessens the cohesive power of the compound and if not guarded against, eventually will tear the tire away from the steel rim. Not only does the wave ruin the tire, but it also effects the truck as though it were going up hill, involving a constant loss of power.

Methods of Preventing Separation From Base

"Several methods of preventing the separation of the tire from the channel have been devised. One is that of a hard rubber base vulcanized into the channel. The channel has a saw-tooth base, and the hard rubber filling these saw teeth, and vulcanized into them, becomes an integral part of the channel base. This this hard rubber in turn, is vulcanized the tread.

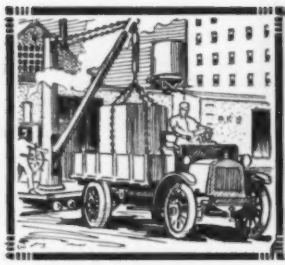
"A second method involves the use of a metal sub-base to which is dove-tailed and vulcanized a hard rubber base. To this hard base the tread is united. No channel is used in this type but side abrasion is prevented by an intermediate band projecting out on each side.

"The side wire tire, is the third preventive of tread separation. Two endless retaining wires with flat sides are sprung ever the edge of the rim, and engage the ends of the cross wires which are flat on the upper side.

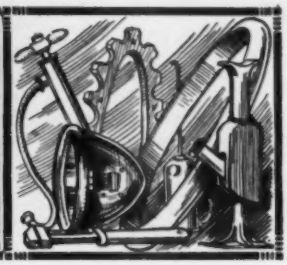
"Whether or not tread separation is prevented, however, overloading remains injurious to the tire. The compound is crushed and sooner or later is broken down entirely."

Thirty-five Per Cent More Mileage on Kerosene

During a test lasting three days, over every kind and condition of road, this Bessemer truck fitted with the G. C. vaporizer, showed thiry-five per cent more mileage per gallon on kerosene than from gasoline, under exactly the same conditions as to route, speed, etc.



TRUCK ACCESSORIES AND APPLIANCES



NEW VEEDER HUB ODOMETER

This model is one of the latest offerings by the Veeder Manufacturing Company, of Hartford, Conn., and is in keeping with the present trend in designing truck accessories, *i.e.*, making the parts heavy and using metals which will withstand hard service.

The dials revolve upon comparatively small shafts or studs, therefore reducing the amount of friction. The dials are locked and prevented from turning, except when driven by the mechanism, and this is not accomplished by means of springs. This locking mechanism is similar to the so-called Geneva motion and has been employed in the Veeder counting mechanism for many years.

There are five dials indicating miles and one dial indicating tenths of miles. This makes it possible to read to 100,000 miles by tenths of miles. The dials and interlocking gears are made entirely of brass or bronze. The figures on the dials are of fused porcelain enamel. The studs upon which they revolve are made of German silver, which will not rust or corrode. The eccentric shaft, which transmits the motion from the inner-driving mechanism through the base plate to the recording mechanism, is made of steel, hardened and polished. It is provided with bearings of brass or composition and surrounded by an adjustable stuffing box in which is placed packing of cotton wicking, thoroughly lubricated with oil. This constitutes a durable bearing which will not allow the passage of the black axle grease into the recording mechanism.

The exterior case of the odometer proper is made of drawn brass and is ¼ in. in thickness. The "lazy tongs" driver which engages with the slotted end of the axle has a great range of action and allows for a large variation in the lengths of the axles. This will take care of a variation of ⅜ in. longer than the standard, or ¼ in. shorter than the standard, or, in other words, a total variation of ⅝ in., and when closed up it takes only ¼ in. space.

The crystal, which is about 3/16 in. in thickness, is fastened into the outer casing by means of a composition metal bezel forced in under great pressure, making it absolutely watertight.

Model K Veeder Hub Odometer

THE SIRO CARBURETOR

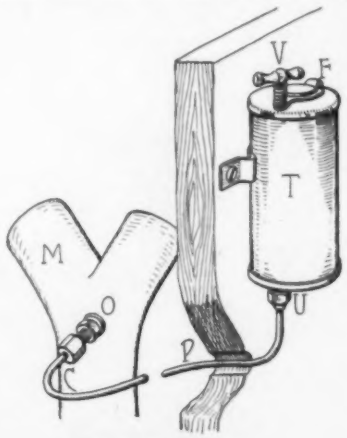
This carburetor consists of a "U"-shaped mixing chamber, at one end of which is a throttle valve and at the other a mechanically operated auxiliary air valve. These valves are so arranged that when the throttle valve is being opened the auxiliary valve opens in exact proportion to it. At the bottom of the "U" is an initial air tube concentric with the float chamber and in the center of which is the fuel nozzle. The needle valve is so constructed that it is connected with the throttle and auxiliary air valve and when the throttle valve is opened or closed, the auxiliary air valve as well as the needle valve opens or closes in the proper proportions. The opening and closing of the needle valve is effected by the use of a cam. By means of a dial on the top of the mixing chamber, the adjustment may be made, so that the time, as well as the extent of opening, may be governed.

The Siro Carburetor

All working parts of the Siro are in blind bearings, an arrangement which it is claimed eliminates air leaks. The float is of spun copper, made in two pieces and soldered. All moving parts are carefully made of the best bronze metal, fitted to gages and are interchangeable. This device is listed at $10 for the ¾-in. and $12 for the 1-in. size. It is manufactured by the Siro Carburetor Manufacturing Company, Northampton, Mass.

THE INDIANA PRIMER

The difficulty of starting a car in cold weather, due to the poor vaporizing qualities of commercial gasoline, has brought out a number of devices for priming the motor to facilitate starting. One of the simplest of these is the Indiana Primer, made by the Engineering Equipment Company, 1201 State Life Building, Indianapolis. The device consists of a small nickeled tank that goes on the car dash, with a valve and a tube leading to the intake pipe. In starting, the valve is opened slightly, the tank having previously been filled with a high test gasoline. This primes the motor and allows an easy and quick start to be made. If the carburetor is touchy until warmed up, the primer valve is left open for a few minutes, to supply a rich mixture to the motor.



The Indiana Primer

Priming tank is located on the dash, while a valve is screwed into the intake manifold, the two being joined by a copper tube.

The primer is also useful for putting kerosene into the motor to loosen up carbon deposits. This priming outfit sells for $2.50.

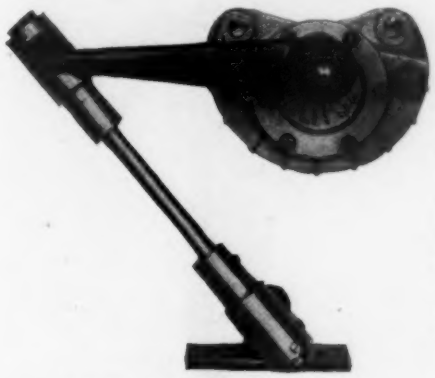
NEW SPARTON SAFETY BLADE FAN

This is a new product which the Sparks-Withington Company, Jackson, Mich., has just marketed. The feature of it is that the rim has been placed on the extreme edge towards the radiator instead of in the center of the blade as formerly. This protects the radiator from being injured if the radiator should move or the fan become loose.

NEW ECLIPSE SHOCK ABSORBER

The new Eclipse shock absorber, brought out by Herz & Company, New York City, constitutes a complete departure from all previous constructions. The resistance necessary for the absorption of the spring vibration in Herz's new shock absorber is produced by the swinging movement of a steel lever in an inalterable specially compounded substance.

The substance is enclosed in a cast iron box, which box contains the bearings for the swinging steel lever. The substance produces a certain resistance to the movement of the lever, which resistance varies proportionally to the size of the impulse coming from the springs. A small resistance produces itself for a small spring movement and a greater resistance is automatically generated for a greater spring oscillation. This is the cardinal feature of the Herz shock absorber and this makes a complete annihilation of large and small vibration possible and certain.

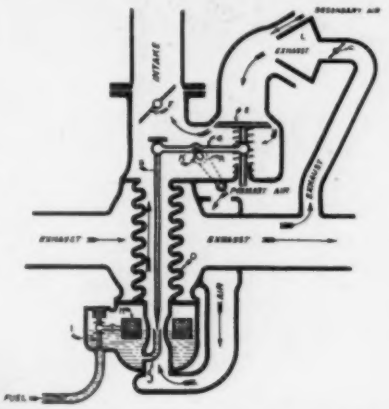


New Herz Eclipse Shock Absorber

This device prevents breakage of the springs and sudden jerks caused by unevenness of the road. There can be no sudden recoil of the springs, the device automatically adjusting its resistance to the demand and preventing the spring from suddenly lifting the body. It prevents the wheels from leaving the road and therefore avoids the sliding of the wheels on slippery pavement. The mechanical construction of the whole device is so simple that there is really nothing to get out of order on the same. A cast iron box is secured to the frame of the car. In this box between two bearings swings a lever to which on the outside attaches a lever with a ball socket on the end A rod connects the socket end to a ball joint fastened to the spring of the car.

MORE DETAILS REGARDING THE HARROUN KEROSENE CARBURETOR

In a recent issue we showed an exterior view of the Harroun Kerosene Carburetor, a sectional or interior view to show its operation not being available at that time. The accompanying cut shows the interior arrangement of the Harroun device, which is claimed to give 10 per cent. greater mileage when using kerosene than when using gasoline. This carburetor is now being made by the Electric Renovator Company, of Pittsburgh, which concern has consolidated with the Harroun Company. The operation and construction of this carburetor is as follows: Part of the exhaust is forced through the space around the venturi which heats this corrugated surface to a cherry red. This venturi pas-



The Harroun Kerosene Carburetor

sage is in the form of a spiral and as the dense atomized fuel is drawn through by the suction of the motor the heavier parts are thrown to the outside against the heated surface by the centrifugal force and the more volatile portion of the fuel remains in the center.

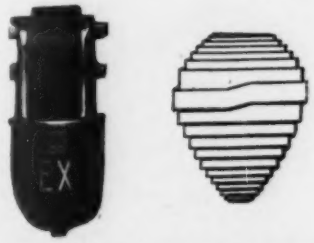
The fuel as it is sprayed from the nozzle and comes in contact with this hot surface is turned into a vapor. This vapor is partially mixed with air which comes through from the bottom of the venturi and is further diluted with cold air which comes through the secondary air valve.

The fuel opening in the nozzle is automatically opened and closed by the action of the secondary air valve. There is but one adjustment on this carburetor. That is operated from the driver's seat through a suitable connection to the lever (A) on the side of the carburetor. This raises and lowers the fulcrum of the rocker arm (G) which is inside of the carburetor and raises and lowers the needle (B) as it is actuated by the air valve (E).

One of the original features of this carburetor is that of taking a small portion of the exhaust gas back into the charge through the air valve opening.

It has been discovered that a part of the exhaust gas mixed with the charge eliminates the disagreeable pound which is always more evident with kerosene than with gasoline, and it is claimed that even with gasoline it will positively eliminate a carbon knock in any motor.

There is furnished with this carburetor a means of regulating the amount of exhaust gas used, by the butterfly valve (C). This may be operated from the dash and provides regulation of the maximum expansion period in relation to the piston travel under varying running conditions.



The Rex Shock Absorber and Double Volute Spring

NEW REX SHOCK ABSORBER

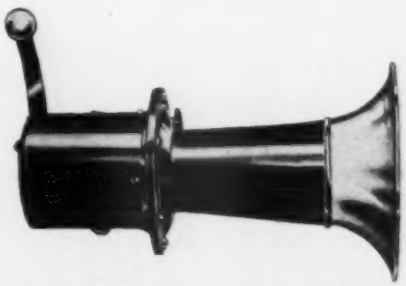
This is another new "end of spring" type shock absorber just marketed by the Rex Shock Absorber Company, of New Rochelle, N. Y., and Stamford, Conn.

This absorber is used on the rear end of the front spring and the rear end of the rear spring. The feature of this device is that the absorber contains a double volute spring in such a way that it will absorb the vibration of the up as well as the down motion of the body; and with the use of only one nut, which adjusts the tension of the spring.

The benefit of the volute spring is that it is strong enough to bear certain weights and still be flexible enough to give under varying road conditions. The shock absorber's frame is made in one piece, with one inner fork, also in one piece for moving up and down; this inner fork is a compact guide inside the outer frame, and makes the whole absorber very strong in construction and does not cause any wear on the inside mechanism. The spring is placed in an oiltight cover. From the frame and through the spring is a single steel rod, with one adjusting nut on lower end of the rod.

NEW HAND-OPERATED HORN

The Sparks-Withington Company, of Jackson, Mich., has just brought out a hand-operated horn known as the "Sparton Echo," which is claimed to be equal in tone to this concern's electric motor driven horn. The striking feature of this article



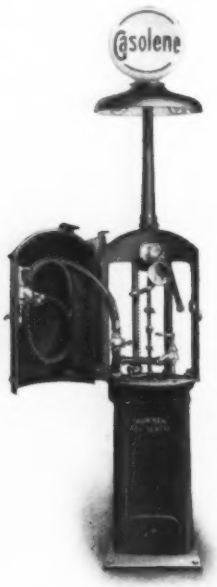
New Hand-Operated "Sparton Echo"

is that there are no gears of any kind in its construction, it being simple in construction, and all wearing parts are hardened. It can be so located that it can be operated either by hand, elbow, knee or foot. The tone can be adjusted to suit with an ordinary screw driver, without taking the instrument apart. It is made in two models, Model J listing at $7 and Model B at $8.

NEW BOWSER PRODUCTS

S. F. Bowser and Company, Fort Wayne, Ind., has just made a few additions to its line of fuel dispensing apparatus, in the shape of a new light attachment for the Red Sentry and a new five and a one-gallon pump. The light attachment is clearly seen in the accompanying illustration.

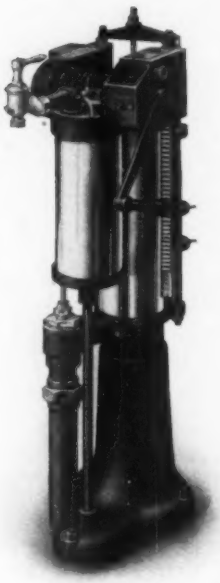
The new one-gallon pump discharges a gallon at a full stroke of the plunger. Intermediate stops are provided for half-gallons, quarts and pints and a graduated scale enables the operator to discharge accurately intermediate quantities. This pump is equipped with an automatic meter which registers all liquid discharged from the pump up to 100,000 gallons, and then repeats. It also has a set back counter which registers up to 100 gallons and can be set back to zero whenever desired. These two features are a great convenience as they enable the operator to tell exactly how much gasoline has been pumped at one operation and also keeps a continuous record of all liquid dis-



Bowser "Red Sentry" With Improved Lighting Attachment

charged from the pump. The Bowser centrifugal filter with which the pump is equipped takes all water and other impurities from the gasoline as it is pumped. The pump is so designed that the plunger is returned to its original position with only one turn of the handle.

The new five-gallon pump discharges at a full stroke of the plunger 5 gallons. Stops are provided for 2 gallons and 1 gallon; also a graduated scale which enables the operator to discharge accurately and quickly any intermediate gallon, half-gallon, quart or pint. The pump is virtually one of a maximum capacity of 5 gallons and a minimum of one pint. This pump is also equipped with a continuous counter, or meter, registering up to 100,000 gallons; a discharge register, tallying from one to ten and repeating. The pump also has the quick return feature the same

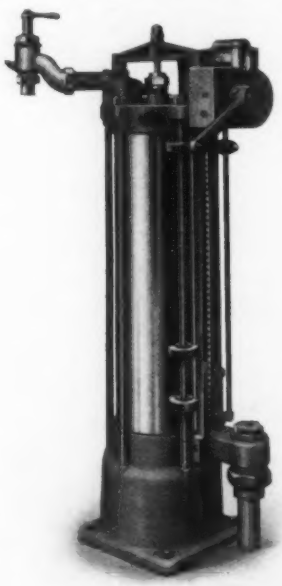


Bowser "Quick Service" Gallon Self-Measuring Pump

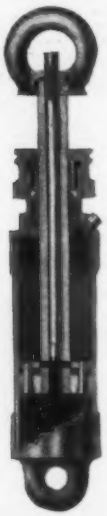
as the one-gallon pump. This equipment is built to conform to that measure of safety prescribed by the National Board of Fire Underwriters.

FLENTJE AUTOMATIC HYDRAULIC JOUNCE AND RECOIL PREVENTER

This device, which is well known in the pleasure car field, is now being called to the attention of truck users and manufacturers as a means for cutting tire expenses in half and saving wear and tear on the machine. In pleasure car service the main reason for using a device of this kind is to make riding more comfortable, while in truck service the wear and tear on the machine and the tire expense are the first things to consider. The Flentje device eliminates the snap which usually breaks the spring, and by keeping the tires in close contact with the road eliminates unnecessary buffing off of the rubber tread. This device works on the hydraulic principle, the operation being easily understood by referring to the accompanying sectional view. The cylinder is filled with a mixture of Oil-O-Mica, which is not affected by weather changes. The piston has three beveled holes and a valve, the latter opening about three-quarters of an inch on the down stroke. If the piston is forced violently downwards, the oil forms a soft cushion. On the recoil of the spring, the piston holes are closed by the valve, and the oil is forced through two holes in the piston rod on the bottom. The holes are regulated to any degree by means of the needle valve on top the hollow piston rod.



Bowser "Quick Service" Five-Gallon Self-Measuring Pump



The Flentje Automatic Hydraulic Jounce and Recoil Preventer

If the car side sways, it is instantly checked automatically, as well as the severe downstroke and recoil. The preventers and fittings are built of phosphor-bronze and steel.

The device works automatically and holds from a pound to two thousand pounds, instantly depending entirely on the severe snap of the spring, either downwards, sidesway or recoil, and through this the truck has traction at all times and stops the goods on the trucks, either large or small, from bouncing or rolling around in the truck.

GOODYEAR LAUNCHES DETACHABLE TREAD TIRE

The Goodyear Tire & Rubber Company have brought out a new type of pneumatic automobile tire that possesses new features of great interest. It consists of a regular tire carcass,—and a detachable tread. When the tire is deflated, the tread can be removed easily, yet when properly inflated, the two parts possess the strength and power of a one-piece tire. This makes it possible to replace either part—carcass or tread, in a

few moments, anywhere, and means that practically a new tire can be obtained, if needed, at about half the usual cost.

The tread is held firmly to the carcass by the inflation of the tire. A secret construction that gives the edges of the tread an unstretchable bead, solves the problem of the necessary grip, and keeps the components safe from invasion by water or dirt.

It is worthy of note that no mechanical fastenings of any kind are necessary. This means there is nothing to impair the resiliency of the tire, or add extra weight.

New Goodyear Separate Tread Tire

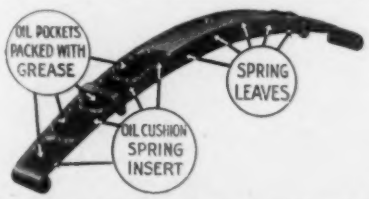
This new tire gives a greater protection from punctures than other types of pneumatic tires. The tread doesn't bear the tube strain and is therefore less tense than the carcass. Tests prove that a sharp object cannot readily pass through a soft medium into a hard one without being deflected.

The tread is built slightly square on the inside, which provides air chambers at the two points of vibration on each side of the center of the tread. This prevents the possibility of injury to the carcass through overheating.

The two parts of this tire are built separately and to exact measurements. When put together they are a perfect fit. There is no loss of power, and no danger of the tread being forced off on a curve. The tread has a wearing surface of sharp edged, wide based blocks, which assure real protection against skidding. Goodyear Detachable Tread Tires have had careful service and mileage tests during the year—and the Company is confident that they will soon occupy a front-rank position among popular Goodyear products.

A DEVICE FOR KEEPING CAR SPRINGS CONSTANTLY LUBRICATED

Neglecting to lubricate the springs of a car soon results in squeaky, rusty springs, which make the car ride hard and increases the chances of spring breakage. To keep the springs constantly lubricated is the object of the Dann Oil Cushion Spring Insert, which is manufactured by the Dann Oil Cushion Spring Insert Company, 2246-50 Indiana Avenue, Chicago.

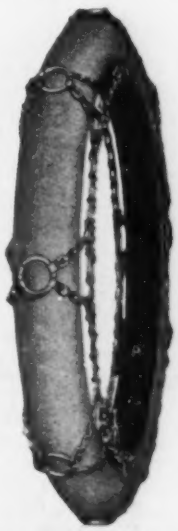


Cutaway Section of Spring, Showing Dann Oil Cushion Insert in Place

The insert consists of a thin perforated strip of metal designed to go between the spring leaves from tip to tip. The metal is of a special composition, very ductile, and possessing anti-frictional qualities. The perforations in the insert are filled with a special, heavy, long-fibrous lubricant. After the insert is placed between the spring leaves and the leaves then drawn together with the center bolt and spring clips, the pockets of the insert are sealed and hold the lubricant perfectly in place. This affords a perfect spring lubrication and allows it to respond instantly to the slightest undulation in the road surface, thereby absorbing the vibration so destructive to the mechanism of the car.

THE WALKER TIRE CHAIN

This tire chain features a drop forged steel ring, which, the manufacturers says, prevents skidding in any direction. The inner surface of the ring is flat, as are the chains, so that they do not cut or roll the tread. By means of a lock lever, the chains can be attached very readily and are held firmly to the tire.



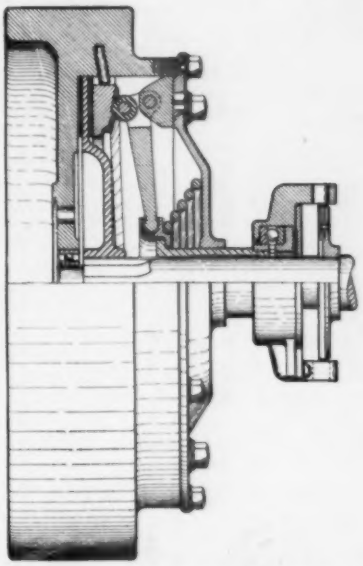
Walker Tire Chain Applied
Note the steel ring which takes the brunt of the road wear

The prices range from $5 for the 28x2½-in. size to $17.50 for the 40x6-in. size. The Walker Tire Chain Company, Zanesville, Ohio, is the manufacturer.

THE BORG & BECK THREE-PLATE, DRY-DISC CLUTCH

The Borg & Beck Company, Moline, Ill., is placing on the market a clutch which seems sufficiently novel to be of especial current interest. As shown in the accompanying illustration, the clutch is seated in the motor flywheel by means of a cylindrical "casing" cast integral with the wheel; a cover member bolted against the outer ring-face of the casing, completing the enclosing of the working parts of the clutch against dirt or dust. The motor power is taken from the flywheel upon the large, thin, steel disc, splined upon the clutch shaft; the outer section of this driven disc mounting between the casing bottom (web of flywheel) and a slidably-mounted member called a "thrust ring."

When the clutch is "thrown-in" the expanding power of the spring acts to force



The Borg and Beck Dry-Disc Clutch

the inner ends of the pivoted levers (bell cranks) toward the flywheel, and the other or short arms of the cranks are forced to "roll" up the bevel face of the thrust ring, thus "wedging" the latter toward the casing bottom until the clutch disc is gripped between the two with power sufficient to overcome the inertia of the load back of the clutch, and thus to "pick-up" and drive the clutch shaft, as part of the power transmission system. Flywheel power is applied to both faces of the driven disc, as the thrust ring (one of the friction members) being slidably keyed in the flywheel, thus also becomes a positive friction driver.

In the cut, between the thrust-ring and the flywheel web, and on either side of the clutch disc, is seen (in black cross-section) two asbestos friction rings, mounted to meet each of the four metallic friction faces, and for the purpose of avoiding any undue heating or wear. It is claimed that a pair of these "Raybestos" rings is good for 50,000 miles, without attention.

The adjustment of this clutch seems both new and effective. The "lugs", upon which the bell cranks are pivotally mounted, are extensions of a full-circle ring; this ring being, in turn, shiftably seated against the inner cover face, and held adjustably in position by cap-bolts reaching in from the outside, through arc-shaped adjustment slots. The object of this adjustable mount of the bell crank ring is to permit the shifting of the cranks about the clutch center sufficiently to change their thrust-rollers, respectively, from any given seat or position against the thrust-ring face, to any

other position desired; it being also true that the roller-face of the ring is not a single plane, but is a succession of three, inclined planes,—these dividing the ring-face into three equal sections. The thickness of the ring, at the top of each incline, is about ¼ in. greater than at the incline bottoms. The cover "slots" are long enough to permit the changing of the thrust rollers up or down the ring inclines to find any adjustment position desired; the adjustment being made from outside the clutch, and, as is claimed, in a very few minutes.

The special points claimed in its favor are: It is a "non-grabbing" clutch, driving by a companion-friction grip upon a polished, driven disc. Its "slippage" relief is automatic, and so effective that, when thrown in instantly, "on high," with the car stationary, no transmission parts are wrecked, and no "jerk" is felt in the starting of the car. It can be "slipped" at will without injury, and the driver quickly learns to use this feature instead of constantly changing gears,—especially in crowded traffic lines. It can be adjusted from the outside, quickly, accurately and "without soiling your gloves."

THE A. V. SHOCK ABSORBER

This shock absorber, which is a French product, is imported by the Hudson Export & Import Company, 140 W. 42d Street, New York City.

This device is designed for heavy commercial cars, whose springs have to be so stiff to stand up under the full loads that they are almost inoperative when the truck is loaded. This condition, it is said, can be improved by the use of this shock absorber, which absorbs both the light and heavy shocks by means of a combination of hydro-pneumatic cylinders supplemented by concentric spiral springs. This method absorbs all the slight jars and shocks which would otherwise be transferred directly to the body of the car, as the springs of the car are too stiff to act under such light loads or when car is empty.

The company states that spiral springs furnish almost as much energy in recoil as is communicated to them, but that the

A. V. Shock Absorber

American Express Company's Trucks in Paris, Equipped With A. V. Shock Absorber

hydro-pneumatic action within the cylinder perfectly absorbs the rebound shocks. The A. V. is furnished in different types and sizes to suit the service conditions, and list at $35 and up per pair.

COATS RESILIENT WHEEL

This tire, to give the required resiliency and eliminate punctures, etc., is being placed on the market by the American Motor Wheel Company, Crawfordsville, Ind.

This wheel has an outer hard rubber tire on a standard S. A. E. rim with six small pneumatic cushions inside, each enclosed within a steel rim. These six steel rims serve as spokes in supporting the periphery

Coats Resilient Wheel

of the wheel and counter-support themselves. In the center of the wheel there is space for the free movement of the axle and the hub.

From the hub extend twelve steel spokes or arms, six in the front and back respectively, a pair for each small cushion. These spokes extend from the hub to the axle or center of the six small cushions, on which the car is suspended. Thus the weight is equally distributed, thereby giving a maximum resiliency and allowing only a minimum shock.

These small cushions do not revolve, hence there is no friction and no reason for a blow-out or a puncture. If it should become necessary to change one of these cushions, it may be done without raising the wheel from the ground. The wheel, however, will serve without inconvenience or trouble with one or more of the cushions removed.

The volume of air in the six small cushions is equivalent to that of a 36 x 7 pneumatic casing. The air pressure may be increased from 30-100 or decreased, according to the load it is to carry.

The cushions are enclosed from the heat, light and moisture, thus preventing the deterioration of the fabric and rubber.

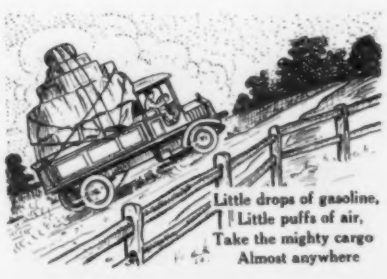
THE HARTFORD CUSHION SPRING

One of the latest devices offered the trade by the Hartford Suspension Company, 1700 Broadway, New York City, is a cushion spring which is designed to assist the action of the springs and give greater flexibility in traveling over small ruts and

The Hartford Cushion Spring

bumps where the action of the wheel is too rapid for the main car or leaf spring to operate. This spring is especially adapted for delivery vehicles and light-weight trucks.

The Hartford cushion spring is simply an additional pair of double-acting, spiral springs attached to the rear shackles. The springs are made of high tempered steel and are enclosed in steel tubes and are noiseless.



NEW COVERT TRANSMISSION FOR TRUCKS

The Covert Motor Vehicle Company, of Lockport, N. Y., has recently added to its line a new transmission of the unit power plant type. This transmission is designed to be bolted directly to the motor case, and is of a suitable size to use on commercial cars of not over 2000 lbs. carrying capacity.

Particular attention is called to the method used in locking the drive shaft, which prevents the end play at the universal joint. The gear shift lever is located on top, in the center of the transmission, and by the specially designed shifting yokes one is enabled to shift the gears in a very easy manner. The brake lever is also located near the center of the transmission, and can be placed to the right or left of the gear shift lever so as to accommodate this transmission for either right or left side drive. This transmission can be supplied with either a cone, or multiple disc clutch.

This company expects to produce, in the near future, a duplicate of this transmission made large enough to be used in connection with a 40-h.p. motor. It is also developing, at the present time a transmission designed to be used on trucks of five-ton capacity.

SPLITDORF BRINGS OUT MAGNETO FOR LIGHT TRUCK

The latest creation of the Splitdorf Electrical Company, Newark, N. J., is a high-tension magneto, designated as "EU-4." and suitable for light trucks, with motors up to 30 h.p. It is water and dustproof.

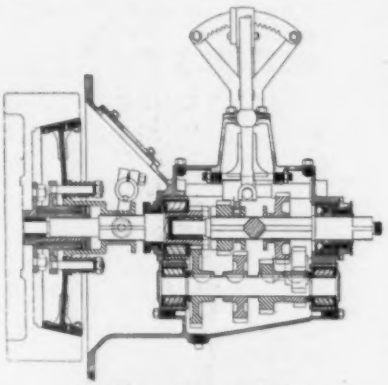
The construction embodies an aluminum base to which the pole pieces are secured, and between which revolves an armature on two annular ball bearings. The armature, after being wound, is impregnated with a suitable oil and heat proof compound, which renders the windings practically indestructible. Mounted over the armature, a condenser is clamped between two metal plates, which are fastened to the pole pieces.

A pair of tungsten steel magnets straddle the pole pieces, and a ribbed aluminum cover fitted tightly over the end plates provides protection from dust, etc., and effectually waterproofs the operating parts.

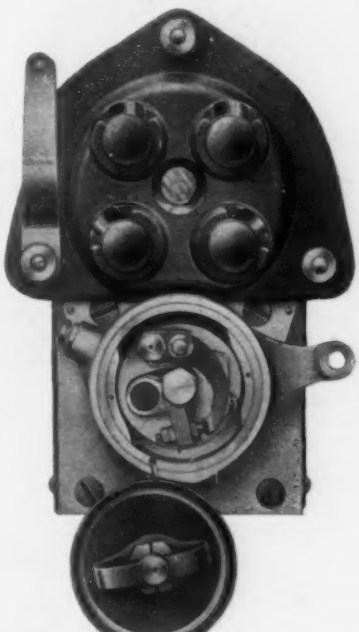
The circuit breaker is attached to one end of the armature shaft and revolves with it. Owing to centrifugal action, the platinum points come in contact in a positive manner at high speed, thus permitting the use of a weaker spring and lessening the wear on the cam. One end of the breaker arm supports a fibre roller which is adjustable for wear. This roller comes into contact with a steel cam, causing the platinum points to separate, thus breaking the primary circuit.

The high tension winding of the armature is connected to a collector ring or segment, imbedded in a spool mounted on the driving end of the armature shaft. From the brass segment a carbon brush leads the current through a waterproof brush holder, having a detachable plug to which the cable leading to the spark plug is connected. The cam holder may be shifted to the extent of 23 degrees, enabling an advance or retard of the spark to be obtained, thereby causing ignition to take place earlier or later. A pin, suitably located on the rim of the cam holder, comes into contact with the cover spring when the cam holder is in the extremely retarded position, thus grounding the primary current and cutting off the spark.

Great care has been taken to prevent any leakage of the high tension current in the connections and cables leading to the spark plug. This magneto is easily installed.



New Covert Transmission
A unit power plant transmission designed for truck of one ton capacity



New Splitdorf High-Tension Magneto
Showing breaker box mechanism

COX'S PNEUMATIC CUSHION

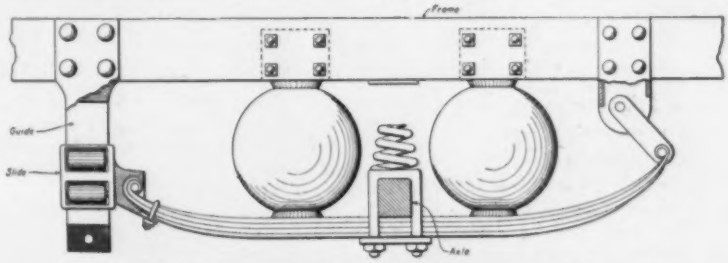
This system is to perform the function of the leaf spring now used as a vehicle support and to greatly reduce the shocks passing from the wheels to the chassis. The three main factors are: A spherically formed, flexible bulb with integral shanks, one solid and the other hollow; a pair of conically formed plungers, and an auxiliary air reservoir.

The bulb is positioned between the pair of conically formed plungers, one of which is bolted to the axle and the other to the chassis. A conduit connects the bulb to the auxiliary air reservoir via the hollow shank. A check valve is attached to a convenient part of the system and the inflating is done with an ordinary air pump.

This pneumatic system performs the function of the present widely used leaf spring as a resilient support for vehicles. However, a part of the leaf spring is retained to provide against lateral strain, but, not for supporting purposes, as the shackle on the rear end of the leaf spring is removed and a roller bearing slide substituted therefor.

As the car wheels are raised by passing over road obstructions the conically formed plungers deform the cushions by folding the walls thereof inwardly. This action displaces a small amount of air from the cushion forcing it to merge with the air in the auxiliary. It also increases the supporting area of the cushion in accordance with the violence of the shock rendered; each inch, or fractional part thereof, thus automatically produced sustaining the blow rendered, the shock therefrom being absorbed by the merging of the air displaced from the cushion with the air in the auxiliary. By comparison with pneumatic tires, the cushion and plungers take the place of the road and tread of the tire, the volume of air in the auxiliary being more than equal to the volume of air in the tire.

It will be observed that the shocks caused by road obstructions are sustained by an automatic increase in the contact area of the cushions with the plungers. The auxiliary air reservoir, owing to its large volume of air, relative to the small amount of air displaced from the cushions obviating any perceptible increase in the air pressure, thereby allowing a long travel of the plungers into the cushion, by an inward folding of the cushion walls, and a soft, easy reaction, or, re-formation, of the cushion, thus obviating any violent rebound. This device is being placed on the market by the Coxs' Pneumatic Cushion Company, 2010 Broadway, New York City, and can be used on any capacity commercial car.



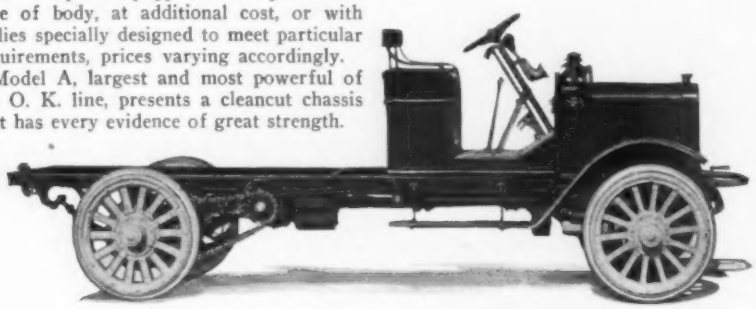
Side View of Cox's Pneumatic Cushion on Truck
The rear end of the spring is free to travel up and down the guide

O.K. Motor Trucks—Three Capacities

By LEN G. SHAW

THREE models make up the offering of the O. K. Motor Truck Company, Detroit, Mich. These are Model A, one and a half to two-ton capacity; Model B, one-ton, and Model C, a 1200-lb. delivery car. The chasses list respectively at $1850, $1450 and $850. They are equipped with any standard type of body, at additional cost, or with bodies specially designed to meet particular requirements, prices varying accordingly.

Model A, largest and most powerful of the O. K. line, presents a cleancut chassis that has every evidence of great strength.



O.K. Model A, Two-Ton Truck; Price, $1850

Four-cylinder Continental motor, 4⅛ in. bore, 5¼ in. stroke; 36 x 4 in. front and 38 x 5 in. rear tires; 14 in. brake drums; leather-faced cone clutch; three speed selective type transmission; 130 in. wheelbase.

The Motor

The power plant is located under a well-formed hood that adds much to the appearance of the truck. It consists of a Continental four-cylinder vertical L-head type motor, 4⅛-in. bore x 5¼-in. stroke, developing 35 h.p. Following out the policy adopted by manufacturers of motor trucks for rational users—and some others—the maximum speed is placed at 15 m.p.h., this being automatically controlled by a governor. This governor's efficiency is guaranteed—a safeguard against reckless driving worthy of consideration.

Cooling is effected by means of a radiator of large capacity, water circulation being maintained through the medium of a centrifugal pump, the cylinders being liberally jacketed. A large ball bearing belt driven fan is located just at the rear of the radiator. Ignition is by means of a Bosch single system, located at the right of the engine, with automatic spark advance. Carburetor is of standard type, the intake being 1¼ in. in diameter, so that ample fuel supply and free action is assured.

All valves are on the left side of motor, the inlet and exhaust manifolds of course being located on the same side.

Lubrication is assured by a force feed, constant level system, two plunger pumps being driven by an eccentric from the cam shaft. The oil is first pumped through copper tubes to the timing gears and the rear main bearing, then drains back into the crank case, maintaining the proper level for the splash lubrication of crank shaft bearings, pistons and connecting rods. Excess oil may easily be drained, while the chamber is equipped in such a manner that it can be emptied.

Spark and throttle levers are located on the stout steering column, which is placed at a convenient as well as symmetrical angle. A foot accelerator acts within the limits of the governor, excessive action in this quarter being thus effectually checked.

Left side drive is employed, change speed and emergency brake levers being in the center, at right of driver. Clutch and service brake are manipulated by the customary foot pedals.

Clutch, Transmission and Drive

A large cone clutch is fitted in the flywheel, with ample sized propeller shaft to transmission, universal joints operating at either end of the drive shaft. The transmission housing is bolted to the jack shaft casing, as shown in the accompanying illustration, with access to the gears through a plate on top of the housing. Three speeds and reverse are provided, the selective sliding gears being of chrome nickel steel with extra large face. The gear ratio is 8½ to 1 on high. Annular ball bearings are used.

A plate on the rear of the differential housing gives access for examination. The tubular housing enclosing the jack shaft gives added strength to the frame.

From sprockets on the end of the full floating jack shaft, chain drive continues to the rear wheels, heavy chains being used. The differential is of bevel gear type and of chrome nickel steel.

Service and emergency brakes operate through large drums on the rear wheels, bands having Thermoid facing and being positive in action. Brake rods parallel the radius rods, and pull in a straight line.

Frame, Springs, etc.

No effort has been spared in providing a substantial frame with exceptional strength for vertical loading. It is of pressed steel, flanges being of 3-16-in. stock, 4 in. wide by 4 9-16 in. deep. The flanges taper slightly at the rear of the jack shaft. Cross members placed where the strain will be greatest and gusset plates give great rigidity.

O.K. Model B, One-Ton Truck; Price, $1600

Continental motor, 3¾ x 5¼; tires 36 x 3½ in. front, 38 x 4 in. rear; wheelbase 120 in.; standard gauge

Springs are semi-elliptic, 2½ in. wide, 40 in. long in front and 48 in. at the rear. Spring pads are forged integral with the axles, the front of I-beam type, 1½ x 2½ in. Rear is one piece solid, 1¾ x 2¾ in. Wheels are artillery type, with fourteen spokes 2 in. square front and 2¼ in. square on the rear. The height of frame from the ground with one-ton load is about 28 in., road clearance being 10 in.

with the water jackets, of 3½ gals. A propeller-like fan assists in the cooling operation, it being driven by a belt and pulley.

A high tension magneto with set spark furnishes ignition.

Clutch, Transmission

The transmission and clutch, the latter a leather-faced cone, are in unit with the motor in an oiltight case.

O.K. Model D, 1250 lb. Truck; Price, $900
Continental motor, 3½ in. bore, 5 in. stroke; wheelbase 112 in.

Other general dimensions are: Wheelbase, 144 in.; length over all, 220 in.; loading platform back of seat, 128 in. minimum; tires, 36 x 3½ in. front, 38 x 5 in. rear, single solid; weight of chassis approximately 4200 lbs. With driver's seat complete, three oil lamps, horn, kit of tools, jack and tool box, the chassis sells for $1850.

Model B

Following in a general way the same lines as the Model A, but of a little lighter construction, inasmuch as it is given a one-ton capacity, is Model B. The motor has 3¾-in. bore by 5¼ in. stroke, developing 30 h.p. Wheelbase is 120 in., and the loading platform back of the driver's seat is 96 in. The chassis weighs 3200 lbs; 34 x 3 in. front and 34 x 4 in. rear single solid tires are used. With the same equipment as Model A, Model B chassis sells for $1400.

Model C

Model C, third of the O. K. line, is sufficiently different to entitle it to more extended mention. It is a shaft-driven 1200-lb. delivery car, with four-cylinder motor and unit power plant, with 110-in. wheelbase.

Motor

The motor is 22 h.p. 3½-in. bore, 4¼-in. stroke. The three-bearing crank shaft rests on ample bearing surface, the front being 3½ in. long by 1½ in. in diameter, die cast nickel babbit. Cylinders are cast in pairs, to allow for a liberal center crank shaft bearing. Magneto and water pump are located on the right side, the valves and carburetor being at the left.

Cooling is by means of a direct connected gear pump which forces the water through a cellular type of radiator, with a core depth of 3 in., and a capacity, together

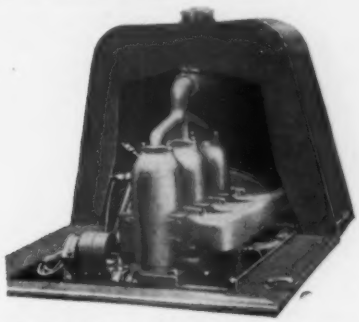
Frame is of pressed steel, with a channel depth of 4¼ in., cross members and brackets being not riveted. The front axle is Weston-Mott drop forge I-beam type, 3⅜ x 1½ in. The rear axle is the same make, three-quarter floating. This carries the differential, propelled by a drive shaft connecting it with the unit power plant. Rear wheels are keyed to a taper shaft, with heavy duty roller bearings running on the axle housing. Ball bearings are used in the front wheels. Internal and external brakes operate on each rear wheel, the brakes having a 14-in. diameter and 2-in. face. Front springs are semi-elliptic, rear full elliptic. The wheelbase is 110 in. Fitted with standard equipment, Model C sells for $850.

PALMER-MOORE HAS WATER-COOLED MOTOR

To satisfy the demands of those prospective truck owners who insist on a water-cooling system, The Palmer-Moore Company, Syracuse, N. Y., manufacturer of that line of air-cooled trucks, announces the Palmer-Moore water-cooled motor.

This motor is the same type, size and construction and has the same variable port features that characterize that company's valveless air-cooled motor. It has the same base, crank shaft, bearings, connecting rods and pistons and the same bore and stroke of the cylinders—it is the same motor except that the cylinders are water jacketed. A choice between the two cooling systems, is given the purchaser.

The radiator has 30 per cent. greater capacity than is necessary for a motor of this size. It is of the dash-board type, located back of the motor, lessening damage to it from collisions, etc.



Palmer-Moore Water-Cooled Motor

The standard equipment is a multiple disc clutch with a three-speed sliding gear transmission. A planetary transmission may be had instead of the sliding gear, and thus equipped the price is $50 less.

The water-cooled trucks are $150 more than the corresponding air-cooled machine. The prices are: Chassis, $1300; standard open express, $1425; standard stake body, $1425; standard four post express (full set of curtains), $1475; standard panel top, $1500.

Palmer-Moore Express With Water-Cooled Motor; $1475
This truck is sixteen hundred pounds capacity and sells at $1425, with flare-board body

The Standard Three-Ton Truck—Five Wheelbases

THE Standard truck, which is manufactured by the Standard Motor Truck Company of Detroit, Mich., is an assembly of standard parts produced by well-known manufacturers; for instance Continental motor. Brown-Lipe transmission, Timken axles, etc.

The Standard Motor Truck Company states that it has been informed by the makers of the component parts of the truck, that if the truck company itself should become unable to supply repair parts for these units, the maker of the unit will be able to and will supply the parts.

Since the localities where the trucks are used differ, this truck is furnished in eight different gear ratios, so that the gear ratio most suitable for the work can be secured. To supply a most useful size for the user, so that coal dealers or telephone pole men can use this truck with the greatest economy in each case, it is built in any length of loading space, and with a wheelbase ranging from 72 to 288 in., but the standard wheelbase is 144 in.

The Motor

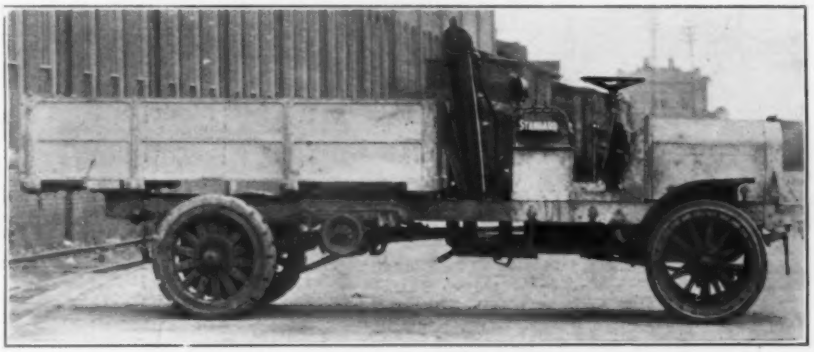
The motor is four-cylinder, cast in pairs, L-head type, 4½-in. bore and 5½-in. stroke. As stated above this unit is of Continental manufacture. The valves are enclosed and all on the left side of the motor. Both inlet and exhaust valves are interchangeable and have nickel steel heads, welded to carbon steel stems, with ends hardened to resist tappet action, and have oil tempered springs. The cylinder base flange is extended to carry the valve lifter guides. The cam shaft is drop forged, with integral cams. It operates on long white bronze bearings. The push rods are of the mushroom type. All gears are helically cut on automatic hobbing machines to maintain gear centers.

Pistons are cast of the same grade of material as the cylinders. Each piston has four diagonally split eccentric rings. Five oil grooves are turned on the piston to collect and distribute the oil splash on the cylinder walls. The piston pin is pinched in the small end of the connecting rod and has its bearings in the piston bosses. Connecting rods are of I-beam construction. Caps are held by nickel steel bolts, with a proper locking device. The crank shaft is of the three bearing type, with liberal size bearings. It is drop forged from special steel and heat treated. The crank case is of the split type, all bearings being carried in the upper half. When the lower half, which contains the oil reservoir, is removed, the bearings are easily taken up for any wear. Water circulation is maintained by a large centrifugal pump and radiator. A belt driven fan aids in keeping the motor cool.

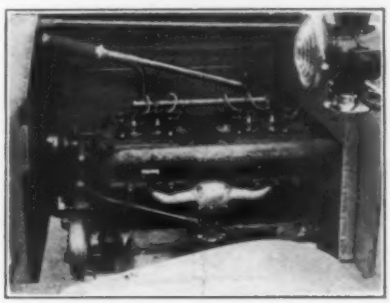
A double plunger pump circulates the oil. One stream is forced over the timing gears in front and another over the rear main bearings, while the middle bearing, pistons, etc., are lubricated by the splash system. Gasoline tank, which holds 22 gal., is under the seat; from there the gasoline flows by gravity to the Stromberg carburetor. Ignition is supplied by an Eisemann magneto with automatic advance.

Clutch and Transmission

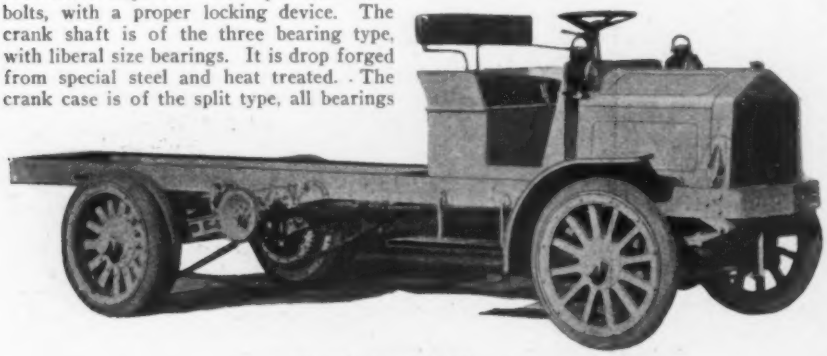
The clutch and transmission are enclosed in bolted-on extension of the crank case. The clutch is a dry disc type with thirteen steel discs, six of which are faced on both sides with Raybestos. It is located in the motor flywheel. The transmission is selective sliding gear, affording three speeds forward and reverse. All gears are 3½ per cent. nickel steel, carefully heat treated. Shafts operate on Timken roller bearings.



Standard Truck Fitted With Wood Hydraulic Hoist, $3500
This body handles sand, coal, asphalt, etc. Wood or steel construction at purchaser's option



Left Side of Standand Motor
Working side of the Continental motor. The pipe just below the intake manifold is part of the governing mechanism, operating a shutter in the intake pipe.



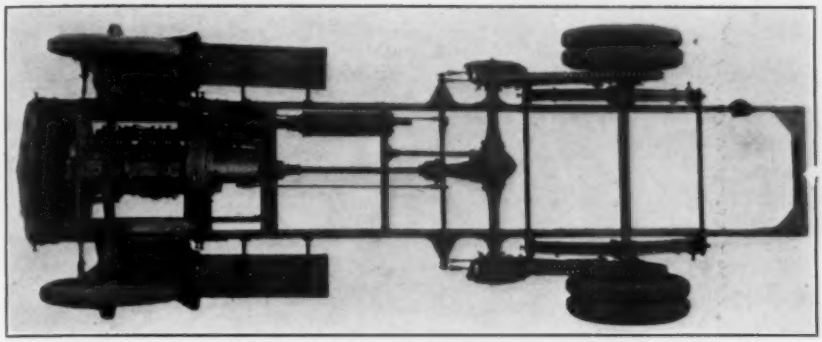
Standard Truck Chassis
Standard wheelbase, 144 in.; capacity, 3 tons; $2750

The Drive

From transmission to jack shaft, the drive is through shaft, having two Spicer universal joints, which are protected by metal dustproof housings and have provision for lubrication. Final drive is by 1½-in. pitch roller chains from jack shaft sprockets to the rear wheel sprockets. Radius rods are of bridge design with vertical swivels. They allow the axle to be twisted out of line without strain on the rods. The rear axle is Timken, rectangular fitted with Timken bearings on spindles. Front axle is Timken drop forged I-beam section, with Timken bearings in the steering knuckle head.

Wheels, Brakes and Springs

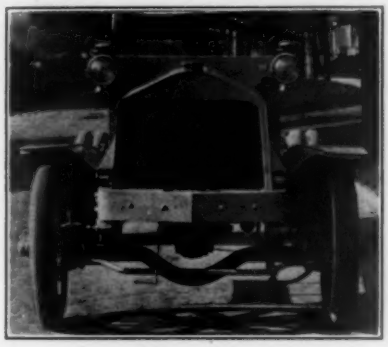
Wheels conform to S. A. E. standard, and will take any make of tire. Rear wheels have fourteen 3½-in. spokes, which are 6½-in. long from hub flange to felloe. Front wheels have twelve 2½-in. spokes. Spoke sockets are very deep on all wheels. The service brake is foot-operated and is external contracting on 12-in. drums on jack shaft ends. Emergency brake is hand-operated and internal expanding on 18-in. drums on rear wheels. Drums are faced with raybestos. Springs are semi-elliptic; 45 x 2½ in. front, 52 x 3½ in. rear. They are made of alloy steel, have bronze eye bushings, and are fitted with grease cups.



Bottom View of Standard Chassis

Other Details

Regular wheelbase is 144 in. Tread is 72 in. rear, with 36 x 5-in. dual tires; 65 in. front, with 36 x 5-in. single tires. A Gemmer steering gear, with heavy worm and gear, operated by 20-in. wheel, is used. All bearings are bronze bushed. Motor is controlled by automatic governor. Speeds within the limit of the governor may be obtained by hand throttle. Drive is on the left side, with center control levers. The frame is 6-in. channel section. Equipment includes seat, three oil lamps, horn, tools and jack. Chasses are shipped in lead, unless otherwise specified. The standard chassis sells at $2750 f. o. b. Detroit.



Front of Standard Truck

The sturdy construction throughout is noteworthy. The starting crank can be swung crosswise, out of the way, when not in use.

AN EFFICIENT TRACTOR

By C. L. EDHOLM

This new tractor has a capacity of 15 tons and handles a string of loaded furniture vans with ease. It is used also for heavy lumber hauling, for handling trailers with crushed rock, etc., for road builders and contractors, and in fact for all the big jobs required of the sturdy little machine. This type of commercial car is in great demand in Los Angeles and in the Southwest generally, where the motor has entered into brisk competition with the railroad for short haul work. It will be of particular value in operating between the city and the twenty-odd suburban towns, connected by excellent roads with the southwestern metropolis.

The Bulkley-Rider tractor, as it is known, was designed by Wm. A. Rider and built by M. S. Bulkley & Company, of Los Angeles. The experimental car was built over from an old Thomas, with a 60 h.p. four-cylinder engine. It has four-speed selective transmission, with a range of speed from 2 to 16 m.p.h., though with a maximum load it would travel at about 4 m.p.h. It has an 80-in. wheelbase and turns in a very short radius. It has a chain drive from double reduction gear and a jack shaft suspended back of the rear wheels.

In handling the trailers shown in this illustration, the rear wheels of the first van are self-steering, while cross cable steering takes care of the other trailers. The tests have shown this car to be remarkably efficient, and the firm expects to manufacture it on a large scale.

THE THOMAS CHEMICAL PUMPING ENGINE

The Thomas automatic fire engine is being manufactured by the Weller-Thomas Company, of Zanesville, Ohio. It uses dry soda, and by mixing it with water, forms the extinguishing solution. Discontinuing feeding the soda makes the machine pump plain water.

The Solution-Forming Apparatus

This fire engine is composed of a series of pumps, a chemical conveyor and a mixing chamber, all geared together in their relations to each other. The rotary water pump lifts the water in the usual manner from plug or draught. The automobile engine operates the water pump and increases the pressure. The chemical pump is operated by the water pump.

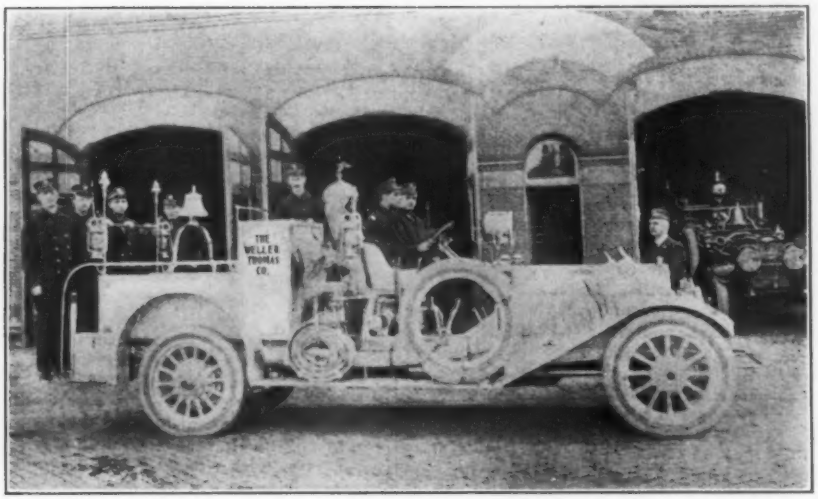
The chemical conveyor also is operated by the water pump and has the same speed as the water pump. The conveyor is set to feed so many ounces of bicarbonate of soda each revolution. The dry soda passes from the conveyor into the mixing chamber and is there dissolved by a small stream of water feeding into the mixing chamber under the pressure of the water pump. The saturated soda solution is taken by the chemical pump and forced into the main body of water as it leaves the water pump. Thus there is a continuous flow of soda solution into the main water column, without interruption if so desired.

The soda is fed dry into the conveyor and from that point on feed is automatic. The soda may be discontinued at the will of the operator; then the pumps continue to discharge plain water without any adjustment of the mechanism. Thus there is a water pump and a chemical pump combined. When the soda is fed into the engine, the entire capacity of the pump, which may be 500, 600 or 700 gals. per minute. is chemicalized.

The dry soda is reduced to solution and thrown into the fire, the heat of the fire liberating the carbonic gas in enormous volumes, smothering large fires in a moment's time, the manufacturer claims.

This engine is designed not only for fire department use, but for stationary engines etc. Also as a special companion piece of

Bulkley-Rider Tractor Drawing Furniture Trailers



The Thomas Fire Engine

motor apparatus for fire department steamers. In this connection, the capacity of a steamer is chemicalized by pumping the water through the Thomas engine. In this case, a rotary water motor takes the place of a lifting pump.

Truck

A special truck manufactured by the White Company is used. For the pumping engine a six-cylinder motor is used, equipped with a White Self Starter and electric lighting system. The pumping engine carries 1000 to 1500 ft. of 2½-in. rubber lined hose and has a chemical capacity of 1000 to 2000 lbs. of dry soda which makes 8000 to 16,000 gals. of chemical without recharging. The Steamer Special will have a White four-cylinder motor, with hose capacity of 1000 to 1500 ft. of hose—and soda capacity of 1 to 2 tons.

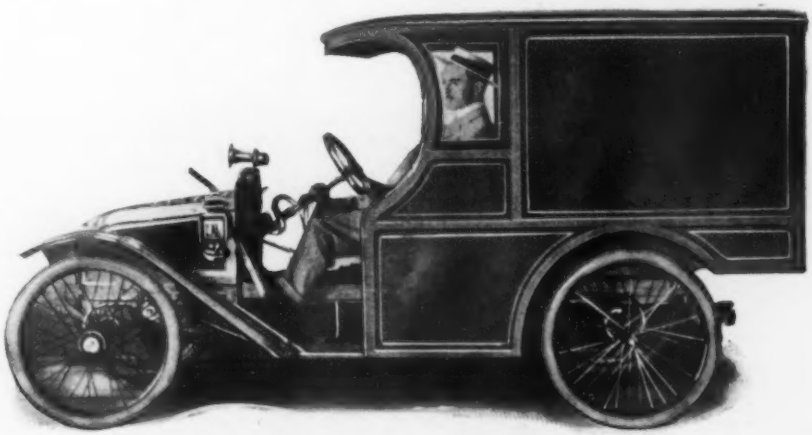
THE WOODS MOBILETTE CYCLE-CAR FOR COMMERCIAL USE

One of the few American cyclecar manufacturers to recognize the commercial possibilities of their creation is the Woods Mobilette Company, 1001-89 W. Madison Street, Chicago, Ill.

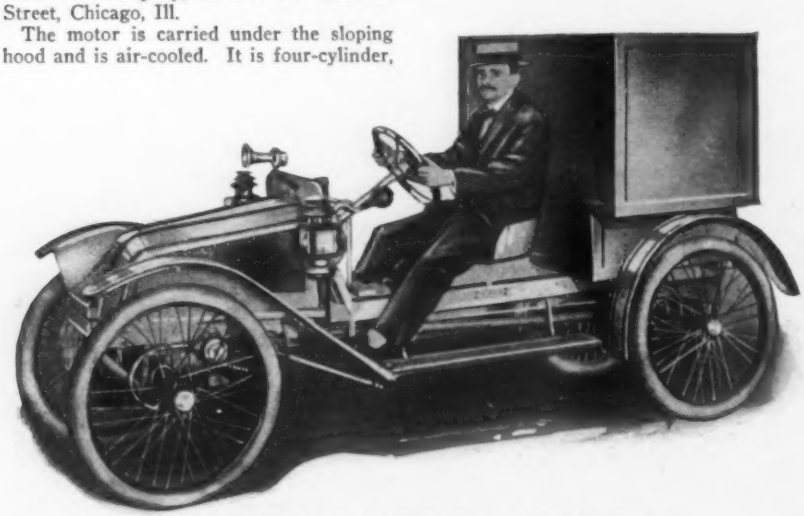
The motor is carried under the sloping hood and is air-cooled. It is four-cylinder, four-cycle vertical and develops, the manufacturer says, 14 h.p. The bore and stroke are 3½ and 3 in. respectively.

Drive is an especially designed friction type, in which the flywheel drives another disc located near the flywheel's periphery and at right angles to it. A third disc, which is squared on the forward end of the drive shaft and free to slide upon it, is the driven disc. It is parallel to the motor flywheel and is moved across the face of the driving disc by means of a conveniently located lever. Drive to rear axle is by an enclosed shaft with a universal joint on its forward end.

The rear axle is a full floating type and wheels are special design interchangeable wire and fitted with 28 x 2¼-in. pneumatic tires. The springs are a specially designed scroll type. The wheelbase is 96 in. and the tread 30 in., with 35 in. width over all. Two types of commercial bodies are mounted on this chassis. When the car is used for pleasure purposes, the tandem system of seating is utilized; when converted into a commercial car, the front seat is retained, the rear seat being supplanted by the commercial body, which may be either a parcel delivery box or a complete panel body. The box body has single or double panelled door, according to order. The body has a cubic capacity of 75 cu. ft. This body can be removed and the car converted into a pleasure vehicle in a few minutes. The full panel body is constructed of either pressed steel or veneers of any wood required. It is well finished and enameled and makes a serviceable vehicle. It has speed, power and light weight, with their ensuing advantages.



Woods Mobilette Fitted With Complete Panel Body



Woods Mobilette Fitted With Parcel-Delivery Body

STEGEMAN TRUCKS WITH OR WITHOUT CHAIN CASES

The Stegeman Motor Car Company, Milwaukee, announces that in order to give the purchasers of its trucks hereafter the choice of either the open or enclosed chain type of drive, it will in the future build its trucks with the chain cases or without.

The prices for open chain cars will be as follows:

1-ton	$2100
2-ton	2800
3-ton	3350
4-ton	3800
5-ton	4200

If enclosed chain drive is wanted, an additional charge of $150 will be made to the above prices.

THE INTERBORO—A NEW 1800lb. CAR

A RECENT entry into the light truck field is the Interboro Motor Truck Company, 811-19 N. Taney Street, Philadelphia, Pa. This concern will produce a machine of 1800-lb. capacity, which will sell at $1850 with chassis, driver's seat, etc.—in fact, everything but the rear fenders and the body, which are supplied as extra. It has a maximum speed of 20 m.p.h.

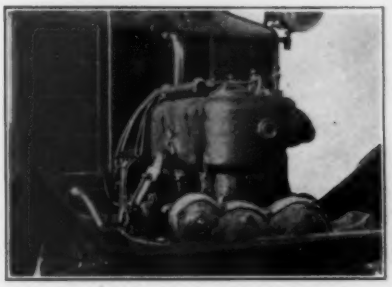
The Motor

This unit is Continental manufacture and four-cylinder. The motor is mounted on the main frame. The front cross member can be easily removed and the motor taken out for inspection, adjustment, etc. It has 3¼-in. bore and 5¼-in. stroke, developing, according to the S. A. E. formula, 22.5 h.p.

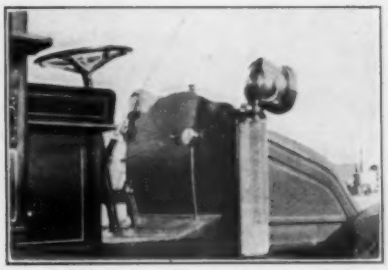
The cylinders are cast en block. Water circulation is by a large centrifugal pump on the right side of the motor and a dash-board type tubular radiator. Lubrication is by combined force and splash.

Clutch and Transmission

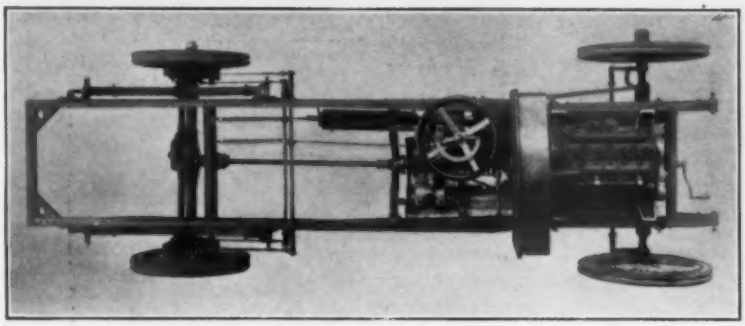
The clutch is a Hele-Shaw multiple disc with a Spicer universal joint between it and the transmission, a selective sliding gear type and a Brown-Lipe product. It gives three speeds forward and one reverse, and is supported from two longitudinal members, which are in turn supported by two cross members.



Under the Interboro Hood
Continental motor and dash-type radiator



Driver's Compartment of Interboro
Left-side drive and center control



Top View of Interboro
Continental motor; Brown-Lipe transmission; Spicer universals; Torbensen rear axle; 124 in. wheelbase; Stromberg G No. 2 carburetor; Simms high-tension Magneto

Side View of Interboro Truck

Drive

Two Spicer universal joints are used on the drive shaft, which carries power from the gear box to the rear axle, which is a Torbensen. The load is supported on a solid I-beam axle. The wheels are driven through external gears.

Other Details

The frame is spot welded at points where the cross members are attached, etc. Springs are semi-elliptic all around, with grease cups on bolts, etc. Either pneumatic or cushion tires can be had in the sizes specified by the tire manufacturers. Steer is left side with center control. The wheelbase is 124 in. Equipment includes Stewart speedometer, Long horn, tools, etc.

CRAWFORD BRINGS OUT COMMERCIAL CAR

The entry of the Crawford Automobile Company, of Hagerstown, Md., is marked by the production of a three-ton truck, which will sell at $3000 for the chassis, bodies being built to order.

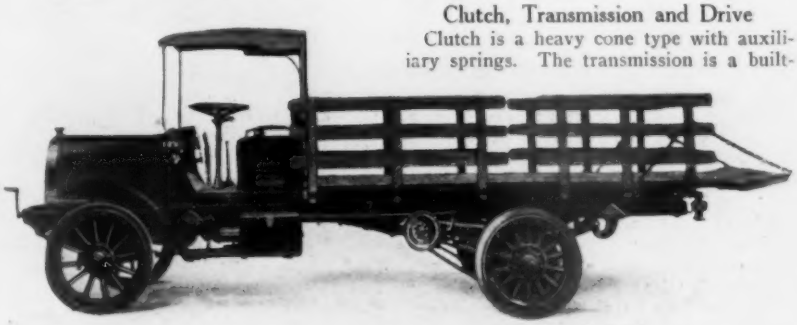
The Motor

The car is powered by a four-cylinder Continental type X motor with 4½-in. bore and 5½-in. stroke. It develops 32.4 h.p. by the S. A. E. formula. Cylinders are cast in pairs.

Cooling water is circulated by a large pump, and a vertical tubular radiator is used. The crank shaft is three-bearing type and 1⅞ in. in diameter. Diameter of valves is 2¼ in. The carburetor is a 1½-in. Stromberg. Lubrication is by a combined force and splash system. A gear pump feeds oil to the main bearing. An oil gage is situated on the right side of the motor. A Remy magneto furnishes the ignition.

Clutch, Transmission and Drive

Clutch is a heavy cone type with auxiliary springs. The transmission is a built-



Crawford Three-Ton Truck
Four-cylinder Continental Motor; 144 in. wheelbase; 37 x 4 in. tires

in unit with jack shaft, and is selective type with three speeds forward. Timken roller bearings are fitted.

Chains are roller quick detachable, with heat treated side members and bone hardened rolls. They ride on machine cut and hardened sprockets, 1¼-in. pitch, ⅞-in. roll and 1 in. wide.

The rear axle is Timken manufacture rectangular 2¼ x 3⅝ in., with 2¾-in. spindles, fitted with roller bearings. The front axle, also a Timken, is I-beam 2¼ x 3⅜ in. Spindle is 2⅛ in. fitted with roller bearings.

Wheels, Brakes and Springs

Second growth white hickory is used in the wheels, which have artillery hubs and extra large flange. They are fitted with solid demountable tires, 37 x 4 in. single in front and dual rear.

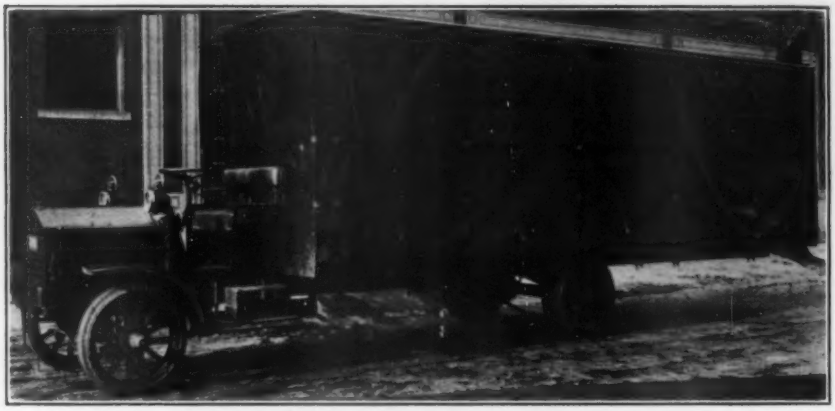
The jack shaft service brakes are 12⅜ in. in diameter and 2-in. face and are operated by foot pedal. The emergency brakes are on the rear wheels, with 18-in. diameter and 3½-in. face.

Both springs are semi-elliptic, with bronze bushed eyes and case hardened spring bolts with grease cups. Front are 43 x 3 in. and rear 52 x 3½ in.

Other Details

Frame is 6-in. structural steel channels, 228 in. long, well braced and hot riveted making a strong flexible frame. Spring hangers are crucible steel castings. A buffer is built into the frame and shaped to form a brace and protect the radiator.

The steering gear is a Gemmer irreversible equipped with throttle controls. The gasoline tank, of 20 gal. capacity is built into the back of the driver's cab seat, which is complete with storm front and curtains. An oil space of one-gal. capacity is also built into the back of the seat. Chassis and seat are finished. The wheelbase is 144 in., with 61 in. front and 65 in. rear tread. Speed is limited to 12 m.p.h.



Standard Truck Carrying Ten Ford Bodies

This model has 216 in. wheelbase with 264 in. loading space. It is used by the Briggs Manufacturing Company, Detroit

GMC Sightseeing Car

Two-ton chassis, body holds thirty passengers; five on each seat. This machine is operated by the Pacific Sight Seeing Company, Pasadena, Cal., and has an average daily mileage of 50. It is operated by uniformed men, who keep the steps up while the car is in motion and lower them at the stop, thus preventing accidents. The owners are greatly pleased with the machines.

PORTABLE SHOW WINDOW

Something distinctly new in retail merchandising has been undertaken by the Richman Brothers Company, clothing manufacturers of Cleveland, who have been using for some time a Peerless six-cylinder car to carry a show case full of its product through the various small towns of Ohio for the inspection of distant customers. The company sells its product direct to the consumer without the assistance of middlemen, and its distribution problem is therefore considerably different from that of most manufacturers. It is difficult to get people to buy clothing by mail because they can get so little idea from a catalog of how a suit is going to look.

So Richman Brothers hit upon the idea of carrying a show case full of its goods right to the consumer. It purchased a Peerless chassis and had a body built along the lines of a show case. Clothing dummies were set up in this and the car driven pretty much all over Northern Ohio. The vehicle was kept on display in conspicuous corners of each town and is accompanied by a salesman to talk up the proposition to those who show interest in the offerings displayed. The scheme has the advantage of carrying to the inhabitants of the small towns a section of the display window of the firm's big store in Cleveland. In fact the unusual use of a motor car in this connection gives the display even greater effectiveness than an ordinary show window. The volume of sales made by the car has been large and the purchase of another vehicle for the purpose is contemplated.

Show Case on Peerless Chassis

EXTRACTS OF PAPERS READ BEFORE S. A. E. DURING ANNUAL WINTER MEETING

The mounting of the Timken bearings is worthy of attention. It will be noted that with the exception of the pinion bearings the cups are mounted in retainers clamped in brackets projecting from the cover-plate. Adjustment is provided for by means of plugs threaded into these retainers. The adjusters are locked by a short, flat bar passing through adjacent lugs projecting from the retainer and the adjusting plug. This mounting is the only one that has stood the test of daily service. All forms of mounting where the cup is carried in adjusters have proven unsatisfactory for the reason that the turning effort set up by the combined thrust and radial loads, loosens the adjuster in the threads in spite of everything that can be done to lock it. It will also be noted that all bearings adjustments, with the exception of the pinion bearings, are inside the case, and can be reached only by removing the inspection cover. This has been done to prevent the drivers from tampering with something they know nothing about, as it has been the fruit of experience that these points, where the bearing sizes are correct, need very little attention, but on the other hand obvious adjustments are apt to be abused.

The remainder of the axle construction is similar to the conventional full-floating axle practice and needs no comment.

Double-Reduction Live Axle, Showing Gears Removed from Axle Casing

Comparison With Other Types

Comparisons of constructions should be based on simplicity, cost, weight and efficiency. The constructions in use are the single-reduction bevel-gear type, the internal gear, the worm gear and the chain drive.

The single-reduction bevel-gear type is applicable only to light service, where low reductions are not necessary, for the obvious reason of the size of gear and housing necessary to obtain reductions greater than 4, or at most 5 to 1; and need therefore not be considered.

From the standpoint of simplicity we must take into consideration first the amount of knowledge possessed by the public of the elements of the construction. From this point of view, the construction is superior to the worm gear type. The second point is the number of parts used, and on this point the worm gear has the advantage with the double-reduction form second, the internal drive third and the chain drive last. Accessibility should also be considered under this head, and here the unhoused chain offers an advantage if one is willing to allow working parts to be exposed to dirt, and to have no adequate lubrication means provided. If the chains are covered, it seems that all the forms under discussion are about on a par.

From the standpoint of cost we feel that for equal quality of workmanship and material the double-reduction form of construction is attractive. Machinery and methods for accurate and rapid production of the component parts of this type are well known, and have been developed to a very high degree, making it a comparatively simple construction for any modern shop to produce.

Considering the relative weight of these different types, it would appear that there is no wide variation probable, on constructions of equal capacities and refinement.

As to efficiency we have to consider not only the performance of the device under the most favorable conditions in the testing laboratory, but the ability of the unit to hold a high percentage of that efficiency under everyday service with the low amount of time and attention usually given. Again, under this head consideration of maintenance should be given.

I regret my inability to quote figures on the efficiency of this device, but up to the date set for this paper it has been impossible, with the time and opportunities available, to procure this information. However, with the perfect protection afforded the working parts, and the possibility of providing an oil bath for them, there is every reason to believe that the efficiency obtained is not reduced by service for a very long period. In fact, with the means of adjustment for wear in the bearings and gears, it is not improbable that the efficiency is constant, or nearly so, throughout the life of the device.

As to maintenance and durability, the following figures illustrate what is possible. There are in daily operation in Philadelphia some nine hundred cars equipped with axles of this type. Some of these are a little over five years old. All the repair work on a great many of these cars is done at our Philadelphia service station. These figures constitute a complete analysis of the work done from January 1st to October 1st, 1913:

Total number of cars repaired	2723
Total number of repair items	3915
Average number of repair items per car	1.44
Proportion of rear-axle trouble, not including brakes, wheels and tires	3.7 per cent.

These figures show in a rough way that, leaving out the wheels and tires and brakes, the mechanism of the axle requires very little attention to keep it in operation.

Conclusion

History that was made in the development of the pleasure car will, we believe, be repeated in commercial car development. For various reasons the chain drive will be displaced by the shaft drive, in one or all of the forms under discussion in the papers presented at this meeting. The double-reduction bevel and spur-gear type offers a simple and reliable solution of the problem, and one which has stood the test of service remarkably well.

WORM-DRIVE TRUCK AXLES*

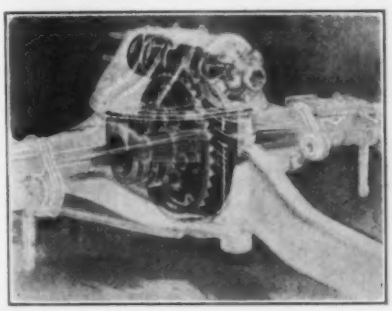
THE introduction of the worm drive to the automobile or motor truck has been surrounded with a glamor—a haze of mystery—which is difficult to account for by those who have had occasion to study the subject. There is no mystery—there is nothing weird to be encountered—there are even very few "niggers" to disturb the dreams of the engineer. How simple is the use of worm drive on trucks. I hope I can demonstrate in this paper.

Archimedes was the first to study the peculiar properties of the helix, about 250 B. C. The Lanchester type, as most know, is a peculiar variation of the more familiar Hindley type. Mr. Lanchester placed the worm below the wheel to insure, as he thought, necessary lubrication.

To Mr. John Dennis belongs the honor of first adapting the worm gear to motor truck rear axle drive.

Mr. John Dennis was also the first to mount the worm on top of the worm wheel. Much criticism was and is still levelled at this, but during eight years of experience with worm drives on all kinds of motor vehicles, I have yet to see a single failure due to lack of sufficient lubrication from this cause. The reason is quite obvious to those who take the trouble to lift off the cover over the worm and watch the streams of oil pouring off the revolving wheel.

As stated, the Dennis axle stood up remarkably well, but gradually experience demonstrated the advantages of an axle in which the worm gear unit was quite distinct from the axle proper. The London General Omnibus Company were the first to design and manufacture on a large scale a new type of worm gear axle in which the worm gear was mounted on a separate assembly. This design has superseded others, until now in some modification or another it is accepted practice. The worm and wheel are mounted in a very rigid block and with their bearings, housings, etc., form a complete unenclosed transmission unit. This is dropped into the bowl and bolted down, forming the complete rear axle. The phantom view herewith shows the internal arrangement very well indeed.



Skeleton View of Worm and Worm Wheel

It will be noticed how accessible is the gearing to the assembler or repair mechanic. Everything is in plain sight. He can blue the wheel for final test of alignment, and can see that everything is snug before putting away. All that is necessary to take out the worm wheel, is to undo the

*Extract from a paper presented by John Younger, engineer, Truck Department, Pierce-Arrow Motor Car Company, before the annual meeting of the Society of Automobile Engineers, January 6, 1914.

nuts on the caps over the differential bearings and lift it out. By means of a simple jig, the gearing can be very accurately aligned, it being advisable to have distance washers or shims of varying thickness inserted behind the thrust bearings, to give just the right amount of adjustment. From the design it is seen that this mounting lends itself very readily to accurate machining, everything being open and readily seen.

It is also very rigid and will prevent any road shocks or stresses, other than those coming through the driving axles, from disturbing the alignment of the worm gear. The housing for this is of the tubular type, amply strong in itself to support the load under road conditions. Looked at from this point of view, this type of axle is at once comparable with the axle wherein the driving mechanism is external to the axle proper, although carried on it; for example Mr. Torbensen's type.

Provision must be made to take care of torque and thrust stresses, and this is done in one or other of the recognized methods.

The driving axle is the last step in the transmission of power to the wheels, and vice versa in the transmission of the braking stresses to the chassis. It must necessarily be of ample section as well as very high-grade material. This detail often gave trouble in the early days, but experience has demonstrated the cure; these troubles are fortunately of the past. I believe it is advisable to make the axle strong enough, with the usual factor of safety, to take care of the driving stresses plus the braking stresses.

Another point to be guarded against is the length of propeller-shaft to be used to avoid "whirling" action. With live-axle long-wheelbase trucks this phenomenon is annoying and can best be gotten rid of by the use of an intermediate bearing and making the shaft in two sections. An excellent paper on this subject was presented last year to the society by Mr. J. W. Thomas.

One other matter of design is the problem of preventing the oil used in the central bowl from running out through the hubs onto the wheels. This involves the use of oil retainers, sometimes on both axle shafts and wheel hub. The presence of a vent pipe often helps to overcome any trouble in this respect.

Efficiency

I will touch very lightly on the very vexed question of worm gear efficiencies. You are told that it ranges from 50 per cent. to 99.9 per cent. Some will argue with you whether it is 98.5 per cent. or 98 per cent. Various and varied experiments have shown me that for all practical purposes it may safely be taken as being in the neighborhood of 95 per cent. under normal conditions. Worm-gear truck manufacturers are constantly asked if their truck can climb hills, or, conversely, coast down them. A standard Pierce-Arrow five-ton truck, fully loaded will start from rest on a 20 per cent. grade (good road bed) and climb the hill. It will, moreover, coast as freely down the hill as if there were no worm gear or any mechanism in the rear axle. In fact, we would be the better pleased if we could get some simple means of keeping speed down in coasting. The resistance offered to coasting by a good worm gear is simply negligible. I have measured this on a five-ton truck with Wimperis' accelerometer and found it averages as low at 20 lbs. per ton of 2000 lbs., or 1 per cent. of the gross weight of the truck.

A worm gearing that come into my experience had a reduction of 13 1-3 to 1, with the angle of lead as low as 19 degrees 47 minutes. This gear coasted quite freely. I am told and quite believe that worm gears with even smaller angles than this have coasted all right.

Interchangeability of Reductions

This brings us at once to the consideration of flexibility of design. To the engineer who wants a big reduction for truck work, the simplicity with which he can effect this at one step by means of the worm gear must appeal. There are no double reductions to bother him. All the reducing is done in one place, once and for all. Not only this, but a large number of reductions can be effected in the one limiting set of conditions. For example, reduction ratios of 6 to 1 for fire engine work, and 12 1-3 to 1 for agricultural work, have been used in the one housing. There were many intermediate steps, 7 to 1, 7¾ to 1 and 9 to 1 all being used. Any pair of these were interchangeable with any other pair. This, then, gives the engineer a range of ratios to suit varying conditions.

Withstanding Abuse

There are many who believe that the worm gear is a very delicate mechanism, hardly suited to the rough usage of an ordinary truck driver. This notion is altogether wrong, for actually the worm gear will stand an astonishing amount of abuse. I have seen a unit in which a ball bearing had broken, causing steel balls to fly around and pass actually through the contact surface of the gears, knocking chunks out of the wheel teeth, one ball actually being imbedded in the worm wheel. Corners of the teeth were knocked off, but everything was smoothed up with hammer, chisel and file, and the gearing put back to run again some 10,000 miles. This is, of course, exceptionally rough usage which I am only instancing as an extreme case to show what worm gearing will stand.

Owing to the straight line contact wear takes place very evenly and uniformly; and the gearing retains its efficiency till worn out. Because also of this contact, a slight variation in the center distances does not materially affect the running of gears, except to produce rather more or less backlash.

It is also evident that with a slight excess in the length of the worm, it can be slid axially along the wheel without any misalignment occurring. The worm should be in as perfect an adjustment as possible in the center of the worm wheel axis. This naturally makes an exceedingly simple assembling process, compared with the three plane alignment necessary in bevel gearing. Moreover, when fitted up, the worm gearing is practically noiseless. Worm gearing is and wears very silently.

Lubrication

Various lubricants have been used; ordinary transmission grease is fairly satisfactory, but the best results are obtained from running gears in a bath of heavy cylinder oil.

From the user's point of view, the advantages are manifold. The housing is filled with a charge of oil which lasts up to 5000 miles, during which time all parts are freely lubricated, perfectly enclosed, and free from the wear caused by the admission of dust, dirt or grit or other abrasive substances. The user can forget there is such a thing as a rear axle in his truck. Contrast that with the care and labor that have to be expended in keeping chains and other unenclosed mechanism in good condition. The constant oiling and greasing and taking up for stretch or wear are all done away with and a no-trouble drive substituted. The advantage of this one feature on a truck engaged in contractors work, hauling sand, coal, brick, etc., can be at once appreciated. Many worm-gear trucks have been put in service in exceptionally gritty atmospheric conditions for just that reason.

Life

The worm gear has a life of well over 50,000 miles, depending of course on the design of the gearing. This figure is a conservative one. I have seen gears subjected to quite hard service that have gone over 80,000 miles. During its life it gives no trouble, and the cost of its final renewal is about one-fifth the cost of the chains that would have been used up on another truck.

Weight

The argument that the extra dead unsupported weight adds to the cost of tires, needs only to be faced with the fact that tires stand up well above their guaranteed mileage on worm-drive trucks, unless road conditions are exceptionally severe. They give better mileage than the average obtained with trucks with other devices in the same locality. In England, it has been shown conclusively, that the live-axle type of truck is easier on tires than the dead axle type; probably because it holds the road better.

I have endeavored in this paper to treat rather broadly of the points to be considered in the adoption of worm drive for truck axles. Naturally I am an enthusiastic advocate of this design and feel that it has no disadvantage that cannot be laid up in far greater measure against other types.

DOUBLE SIDE CHAIN FINAL DRIVE*

IN THIS paper no consideration will be given to trucks of less than two-ton carrying capacity, as the higher speeds at which smaller vehicles run do not necessitate the use of extremely high reduction ratios, and consequently in many cases the requisite reduction can be obtained otherwise than by using double side chains. On trucks from two to seven-ton capacity, inclusive, the requisite reduction ratio between motors and rear wheels may be anywhere from seven to one, up to fourteen and fifteen to one. This high reduction ratio cannot be obtained in a live axle using a single reduction through a pair of bevels, because of road clearance considerations on one hand, and mechanical limitations of the minimum size of driving bevel pinions on the other hand. Until the introduction, at a comparatively recent date, of the worm drive, some form of double-reduction gearing has been used on all heavy motor trucks. The form most commonly used is and has been double side chain final drive, when the primary gear reduction is obtained in bevel gears driving the jack shaft, and a secondary reduction in the chains and sprockets.

This type of drive, utilizing roller chains, has been used on nearly all heavy motor trucks since the inception of the commercial vehicle business. On practically every chain-driven truck on the market to-day the chains are not housed in and run exposed to dust, street dirt and water. This practice is faulty when considered solely from the standpoint of maximum chain life, but the engineer who has designed and built chain enclosures is thoroughly familiar with the difficulties entailed in producing a practical and commercial chain-case. With a

*Extract from a paper presented by H. D. Church, truck engineer, Packard Motor Car Company, before the annual meeting of the Society of Automobile Engineers, January 6, 1914.

Firestone

TRUCK TIRES

Continuous Service at Lowest Cost The towering reputation of the Firestone Company as pioneers and continued leaders in the making of tires is invaluable to you. A forcible proof of this is shown in the Firestone method whereby hot rubber is welded to the brass-treated steel prongs of the channel base. This new practice immeasurably increases the strength of the Hard Rubber Base tire.

The rubber and channel are thus knit together—for into the sharp crevices the hot rubber is forced and cured—never to loosen, never to come out. The tire wears down to the channel, giving a maximum degree of service.

Maximum Mileage Minimum Repairs Firestone Removable Rims are strong features in Firestone Truck service. They are secure, simple, easily handled. Your own driver can make a replacement without trouble, quickly. Maximum mileage, with a minimum of repairs, will be yours when you equip with Firestone.

Quality of Tire Variety of Type There is a Firestone tire for every truck, every road, load or condition of service. There is a Firestone man near who will gladly call and consult with you on the particular tire equipment which will insure you maximum efficiency.

Depending on your trucks, your loads, your special kind of delivery or haulage needs, there is a Firestone tire, or a combination Firestone equipment which will decrease your operating costs.

Write for Truck Tire Catalog now, showing all styles. Then call our man from the Firestone Service Station nearest you. The Catalog contains list of stations.

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chain-case provision must be made for chain adjustment and for relative lateral as well as vertical movement of the sprocket centers, due to action of the rear springs. As a result many joints and bearings are necessary, which require frequent renewal and experience shows that in service the chain-case itself soon becomes more noisy than an exposed chain.

The chief criticisms against chain drive have been on the grounds of excessive noise and rapid wear, but such criticisms are without reasonable foundation if the design and workmanship of the installation are proper, and if proper attention is given to the chains in service.

There has been a great deal of talk in the past few years about the advantages over side chain drive of various forms of gear drives, and it is in order to sum up the chief advantages of double side chains from the standpoint of the user and the engineer.

First—Double side chain constitutes the simplest drive obtainable to meet heavy truck requirements.

Second—It will stand as much, if not more abuse, than any other form of final drive, a highly important consideration at the present time, when many owners do not seem to realize that the motor truck is a high-class mechanism, and should be cared for as such.

Third—The total efficiency of double side chain drive, including the losses in the jack shaft bevels, is as high, if not higher, than any form of gear drive and the additional losses due to worn chains and sprockets are so slight as to be entirely negligible.

Fourth—In event of accident or breakage it is by far the easiest form of final drive to repair. A broken chain can be repaired on the road by any driver with spare links and the ordinary tools carried on the truck. On the other hand, any breakage in the heavily loaded gears of either a worm or internal pinion drive nearly always means a visit to the repair shop. If a chain link breaks it is only necessary to replace the broken link, but if a gear tooth is broken, the entire gear must be replaced; and in case of a worm gear, both the worm and wheel must be replaced with heavy attendant expense.

Fifth—The rear system of a heavy truck is subjected to a great deal of abuse from skidding, collision with curbstones and loading platforms, and the vibratory stresses set up by solid tires on rough-paved road surfaces. With side chain drive it is possible to use a substantial load-carrying member, which is cheaply replaceable in case of damage by accident, and which is better adapted to stand up in service than any built-up type of axle which is used with gear drive.

Sixth—Side chain drive permits of placing the differential gear on the chassis frame. In this position the truck springs cushion it from heavy road shocks. Owing to the fact that the entire gear reduction is not between the motor and the differential gears, the latter do not have to be made abnormally heavy to withstand the high torques incident to such a construction. This objection to the gear drive is most serious when either the worm or bevel and spur reduction is used, as it is then customary for the service brake to act through the differential gear, imposing tremendous loads upon it. With side chain drive none of the gear shafts or bearings in the drive have to carry excessive torque, as the only heavy loads are applied on the rear-wheel bearings, which must be heavy anyway to carry the weight of the rear end of the truck.

Seventh—For a given load-carrying capacity, using the same materials and factors of safety, double side chain drive is the lightest construction known, the lowest in first cost and the cheapest to repair.

Eighth—Any universal joints necessary can with chain drive be arranged to run in line, with no angularity and to carry never more than the maximum motor torque.

Ninth—The weight of the unsprung parts is reduced to a minimum.

Tenth—Heavily loaded torque members are not necessary.

Eleventh—Even if one driving chain is damaged beyond repair on the road, the truck can be driven in under its own power by locking the front sprocket on the side opposite to the remaining chain.

Twelfth—The starting torque of a chain-driven truck is very low and the decrease of efficiency on high gear at low motor speeds under a heavy pull is not as noticeable as in a worm-driven truck.

Considering fifty-eight manufacturers of gasoline motor trucks, double-side chain drive is used by fifty-four manufacturers; internal gear drive is used by two manufacturers; worm drive is used by two manufacturers.

The fact that not only the majority of heavy trucks on the market are chain-driven, but also that the largest individual manufacturers of heavy trucks have always used double side chain final drive and continue to do so, is in itself convincing proof that chains constitute a popular and satisfactory means of transmitting power to the rear wheels.

THE INTERNAL GEAR DRIVEN TRUCK AXLE*

By VIGGO V. TORBENSEN

ET us see if the claims for dependability and rugged strength, made for the internal-gear-driven truck axle, are well founded. The properties of a truck axle, enumerated in order of importance, should be: strength, durability, lightness, accessibility, ease of assembling, low cost, efficiency, simplicity, noiselessness.

As to strength, the internal-gear-driven axle admits of a solid one-piece member for carrying the load; it is usually a drop forging and has therefore, the maximum strength obtainable.

Durability. Every engineer is familiar with bevel gears and knows that a set of such gears properly proportioned, well made and of good material, will outlast the car. There are no unknown quantities to deal with; given the power of the engine and the load upon the truck, the bevel gears can be designed to last indefinitely. This is also true of internal spur gears.

Lightness. The I-beam axle is not only the strongest cross-section for a beam, but the lightest as well. As for the jack shaft and differential, these high-speed members, as compared with the same members in a worm-driven axle, may be made proportionately smaller and lighter. The same holds good for the casing containing them.

Accessibility. The jack shaft being placed in the rear of the I-beam, the differential and drive gears are removable through the back cover as in a touring car floating axle; all moving parts can be taken out in a few minutes by the use of a minimum amount of tools.

Ease of Assembling. This operation is merely a repetition of the last one reversed. Any good average mechanic can handle a set of bevel gears and adjust them accurately, easily and quickly. The internal spur gear and pinion are on fixed centers and require no adjustment.

Cost. Good material, good bearings and good workmanship cost money everywhere, but less weight means less first cost. Furthermore, the manufacture of bevel and spur gears is well developed; large and splendidly equipped plants for their accurate and economical production are in existence all over the country.

Efficiency. No efficiency tests of the internal-gear-driven axle as a whole have been made, so far as I know. It is known that a set of bevel gears will show 97 per cent. efficiency. Estimating the loss in the spur gears at about 5 per cent., the total should be about 92 per cent. The efficiency is fairly constant under all loads. Mechanical efficiency is a desirable object to strive for in transmissions, as well as in motors or any other part of the mechanism connected with a truck, but it is of more importance to attain commercial efficiency. Of course, the former affects the latter to some extent, but where the mechanical efficiency is already fairly high, the loss of 5 per cent. more or less in the transmission affects only slightly the cost per ton-mile. The cost of maintenance, depreciation, wear and tear is what determines the commercial efficiency, and the axle that requires least attention, adjustment, repairs or renewals is commercially the most efficient, irrespective of its mechanical efficiency.

Simplicity. This is a relative term. * * * Taking the internal-gear axle as a whole, there is no final-drive truck axle made that has fewer parts. Even the worm drive requires more bearings in its make-up; twelve by actual count, as against ten for the internal-gear axle. Considered simply as an axle, which is, after all, its chief function, nothing can be simpler than the plain straight solid bar. * * *

Noiselessness. The question of noise, the writer regards as the least important of all in this connection. Well-made and properly meshed bevel gears are no longer noisy. The same can be said of the internal gear. * * *

Lubrication

The most serious problem has been the lubrication of the internal gears. Their large diameter gives plenty of opportunity for the grease to leak out around the edges of the gear and to get onto the brakes. Very little grease is required to keep the gears in good condition. * * * Lately we have adopted a grease packing-ring made from hard drawn brass of rectangular section. It is rolled into a circle and a lock milled in the ends.

This particular type of axle contemplates the use of steel wheels, although wood ones may be used equally well. The small hand hole shown opposite the spur pinion permits the withdrawal of the jack shaft without removing the wheel, so that it will be a short job to take out the differential should this be necessary.

*Paper read before the annual meeting of the society.

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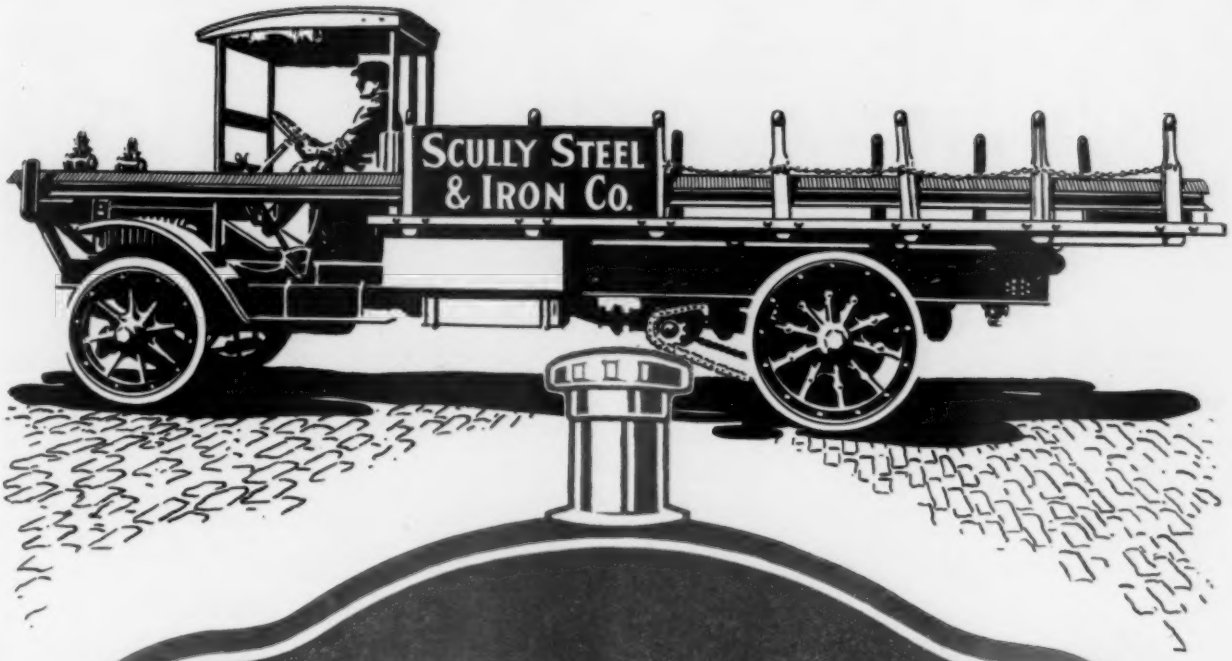
WANTED.—Experienced automobile and truck salesman. New York experience. Best of references. Only live concerns considered.—(Salesman care of The Jour.)

ELECTRIC (Light) TRUCK AGENCY Wanted.—An established and foremost sales agency for light gas motor trucks in New York district are open for handling light electric trucks and delivery wagons. Are in close touch with buyers. Address B. M., THE COMMERCIAL CAR JOURNAL.



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BECAUSE they are easier to operate and easier to take care of. The simple monobloc, small bore engine gives ample power and necessitates little care. The perfect load balance and four speeds, means easy steering, even on the heaviest truck, and a perfect control.

White Trucks also permit the driver to make the best possible showing to his employers in the promptness of his deliveries and the low expense of operation and maintenance.

The favorite truck of the driver is the favorite truck of the owner —because the truck's efficiency largely depends on the driver. Every White driver is a White Truck enthusiast.

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Both in quantity and value of production, the largest manufacturers of Commercial Motor vehicles in America.

How They Gained in 1913

Record of advertising carried by the Leading Motor Truck Journals during 1912 and 1913:

	1912	1913	Gain	Gain per cent
Commercial Car Journal,	542½ pgs.	770½ pgs.	228 pgs.	42 per cent
Power Wagon - - -	961½ "	1071½ "	110 "	11½ " "
Commercial Vehicle -	845¾ "	911½ "	65¾ "	7¾ " "

Commercial Car Journal - - -	*Gained*	*42*	*per*	*cent*
Power Wagon - - - - - - - - - - -	"	11½	"	"
Commercial Vehicle - - - - - - - - -	"	7¾	"	"

Commercial Car Journal — 42 per cent
Power Wagon - - - - — 11½ per cent
Commercial Vehicle - - — 7¾ per cent

True merit always shows up strongest in times of stress.

It is, therefore, significant that this tremendous gain was made by the COMMERCIAL CAR JOURNAL during the period of depression which the trade has experienced during the past season, and clearly indicates leadership.

WORM GEARS

Each year sees an increasing number of trucks in which worm gears have been incorporated. The success of such installations both here and abroad has deepened the conviction of thoughtful truck builders that worm gears are the ultimate form of power transmissions for all the leading motor trucks.

The making of them is, however, a difficult art; one that requires men of long experience and specially designed machinery. These are not easily obtainable and we enjoy a distinct advantage in our unequalled facilities for producing worms and worm wheels.

It is but a plain statement of facts to say that we are the only concern in America having an experience in this construction that enables us to advise you correctly. We have had many years' experience, having been identified with worm drives since their introduction in automobiles in Europe.

We have likewise gathered around us the only engineers in this country who have had European practice and who are qualified to give expert advice on your mountings and general assembly.

Our facilities for production are unequalled and we have the only machines in America that will cut worm wheels theoretically correct.

It should be evident that we can serve you better than anyone else. Give us the horsepower of your car, approximate speed of the driving shaft, ratio required and approximate weight of the machine and let us send you a blue print of what we would recommend.

Why experiment with experimenters?

The Cleveland Worm and Gear Co.

988-992 E. 67th St. :: :: CLEVELAND, OHIO

Felt Washers

N. E. BOOTH MAKES FELT WASHERS—

makes them better and quicker and cheaper than you can probably get them anywhere else in these United States.

The reason? He specializes. He makes it his sole business to supply you with washers, packings, dust and oil rings and other felt goods more advantageously than anyone else can. And he succeeds.

Prove this to your own satisfaction by trying Booth on your next felt order. You'll find the "specialist" can save you both time and money and give better service.

N. E. BOOTH, 644 Pacific St., Brooklyn, N. Y.

CANADIAN OFFICE AND FACTORY, GANANOQUE, ONTARIO

Sternberg

"*Built for Eternity*"

MOTOR TRUCKS 2, 3, 4, 5 and 7 Tons

Every Sternberg Truck Built is Still in Service

For eight years we have been building motor trucks, and so well have they been designed and constructed that every **Sternberg Truck** ever made is still in use, giving dependable, economical and efficient service.

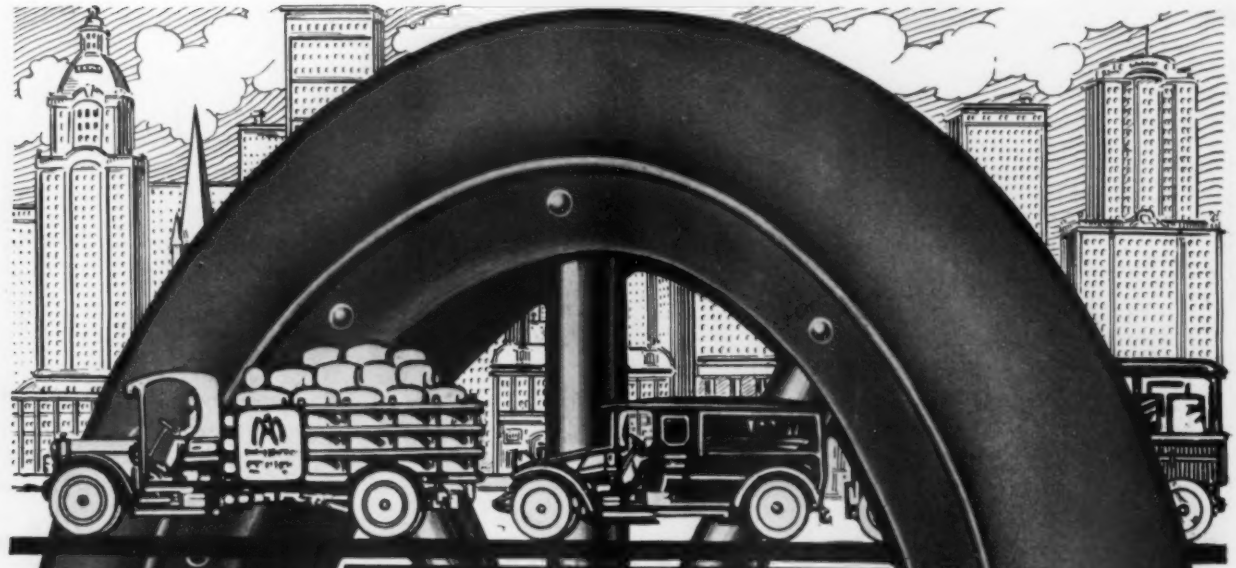
This statement is more eloquent of the quality and character of **Sternberg Trucks** than any detailed argument could possibly be. It is a story of what **has been done,** and not what should be done. It is a record—not of **one** truck—but of the **entire output,** and explains why **ours** is a successful concern.

Dealers' Opportunity

There are great possibilities in **your** territory, and if you want us to help you turn your opportunity into cash, just write us now and say—"Send me your proposition," and we shall be glad to tell you in detail how we actually sell trucks for **Sternberg** dealers by the most thoroughgoing, individual letter campaign ever undertaken by any motor truck manufacturer.

Do you want us to help you succeed? Then just say the words—"Send me your proposition."

STERNBERG MFG. CO., Milwaukee, Wis.



A Continuous Procession
of Trucks Equipped with

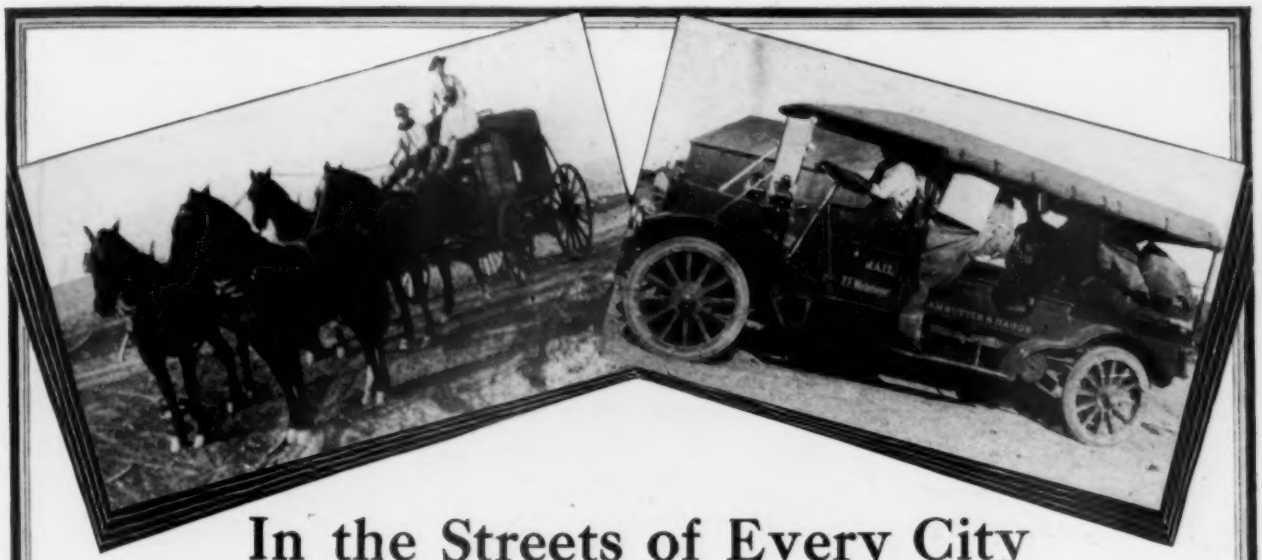
Phineas Jones & Co. Wheels

can be seen in almost
any large city, any time

The knowledge, experience and ability that comes from 58 continuous years of successful wheel making are concentrated in our product. Because of their past records, their present performances, and their unexcelled quality, truck makers and owners put them on their cars with a feeling of absolute confidence.

PHINEAS JONES & COMPANY
Established 1855

305 Market St., Newark, N. J.
12th Ave. & 55th St., New York, N. Y.
1625 South Los Angeles St., Los Angeles, Cal.



In the Streets of Every City On the Rim of Civilization— Always the Federal

THIS newspaper clipping tells its own picturesque story of Federalized Transportation. For on asphalt pavement, on country road, on precipitous mountain trail, in the sands of the desert, the supremacy of the Federal Truck is universally recognized.

FEDERAL REPLACES 32 HORSES ON WYOMING STAGE ROUTE

Federal motor trucks have made some records for sturdiness and ability to eat up work, but the recent experience of the Denver dealer is quite the most illuminating that has yet been reported. At the same time the Denver dealer's account of the picturesque element shows that all the picturesque elements of western life have not yet disappeared. A Federal stage was sold to the Wamsutter-Slater Stage and Expressing Company, of Wyoming. It is being used to cover a route hitherto traveled by stage coach and it passes through one of the most desolate sections of this country. To deliver the truck at Denver it was driven up from Wamsutter, and there was one stretch of 75 miles between Laramie and Medicine Bow, in which there was not a house, fence, post or telegraph line. The distance between Baggs and Wamsutter, the route on which part of the services of this truck is used, is 50 miles. Formerly it required two changes of horses each day, or 24 horses for the round trip. The company also held eight horses in reserve for emergency use; so that the lone Federal has replaced 32 horses. The truck carries about 2,700 pounds on its daily trips

MICHIGAN CROP REPORT

Wheat.—The final estimated yield of

FEDERAL

$1800

F. O. B. Detroit

Federal Motor Truck Co.
Detroit, Michigan

Velie

Which Truck Is Best

The process of elimination has been swift. Four famous rival makes have stood every test. They are backed by millions. Among them the fight for supremacy is keen.

The stability of these four big truck manufacturing companies is assured. Their combined resources are over $25,000,000. Their yearly output runs high into the millions. They are all in business to stay.

Each of these four makers has built the best truck he can. And each of the four has absolutely guaranteed its product.

Of the four, three build trucks in excess of three-ton capacity. But the three-ton truck made by all can best be used as standard of comparison. For the trucks of heavier capacity practically duplicate in every specification, except gear ratio, the three-ton trucks.

And in all three-ton trucks specifications are practically alike. The most noticeable difference is in power. Here the Velie guarantee is 15 horsepower more than one of its most famous competitors. And 6 horsepower greater than the average of the three competitors.

In Strength of Frame, three of these famous trucks use a frame 6 inches deep and one a frame 5 inches deep. But the Velie 6-inch I-beam frame is reinforced by a 4-inch subframe—an exclusive feature—the absence of which would not be noted except perhaps in case of extremely heavy loads.

The average size of the rear wheels—the wheels that carry the driving power—is 39 inches. Although the rear wheels on the Velie Three-Ton Truck, being 40x5 inches, are larger than those used on any of the other three.

Spring equipment is practically identical if attention is not paid to the relief spring furnished on the Three-Ton Velie and on one other of the famous four. In conditions of abnormal load this relief spring is the safety factor to protect the truck from being unduly strained.

Chain Drive on each of the four trucks which have become standard proves the superiority of this type.

An exclusive Velie feature is the Starter Spring Strut Rod, reducing the starting strain over 50% and greatly adding to the life of the truck.

Three of these four famous manufacturers build a two-ton truck. But here, as in the trucks of three-ton capacity, motor specifications, strength of frame and size of wheels show a balance in favor of the Velie. The difference in motor power is, perhaps, even more marked than in the three-ton truck.

Among all these four famous builders the Velie is the only one that builds a standard truck of one-ton capacity. And this sturdy, light-delivery vehicle is equipped with a motor 25% more powerful than that used in any of the less-known makes. In this One-Ton Velie Truck exceptional features—the Electric Starting and Lighting and other conveniences adding to the speed of delivery and economy of service,—establish the balance in favor of the Velie.

But comparative specifications presented in type are not always adequate grounds on which to select a truck. Many newly made, untried trucks backed only by verbal guarantee and with utterly inadequate service resources, often advertise the most alluring specifications.

Velie

of The Big Four?

SO merchants who have bought dozens of trucks now narrow their orders down to the four great makes of rival motor trucks, each with its millions of resources.

Because each of these great organizations stands squarely back of every truck it builds and makes good its guarantees to the letter, giving service that cannot be secured from smaller concerns.

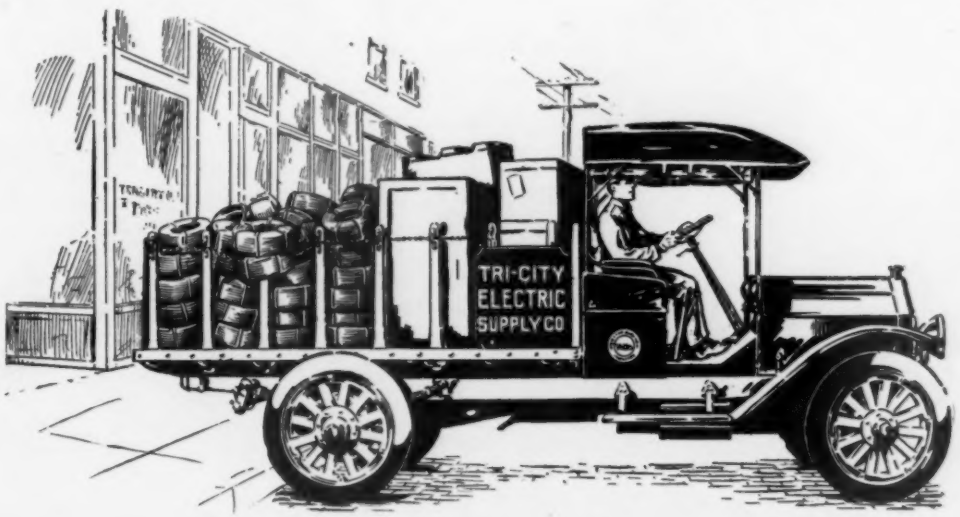
Almost daily keenly competitive tests between these four great makes of trucks are establishing which is the best. For the four are in use by the largest corporations who use trucks by the dozen.

In pulling power the Velie Truck, the only one of the big four unadvertised until now, is proving that a more powerful, slower running motor will in competitive tests out-pull and out-wear all high-speed, quick-wear, small-powered motors.

Experienced buyers can tell by comparison of specifications why it is that the Velie is winning the fiercely competitive tests between the four best makes of trucks.

Any Velie agent has these truck contest results on file—they are convincing—ask to see them.

Send for Truck Booklets



VELIE MOTOR VEHICLE COMPANY

660 Velie Place, Moline, Ill.

QUALITY · QUALITY · QUALITY · QUALITY · QUALITY · QUALITY

Now you must decide!

The tire selling field has undergone a great change in the past 12 months.

The car owner has become disgusted with tires that demanded constant replacements and adjustments.

More than ever he is looking for real quality, real service — *real mileage*.

For a time he was satisfied with tires made to "sell."

Now he is demanding the tires made to "use."

You must decide which tire you are going to sell

Will you cater to first-time sales with "popular-priced" tires — bearing yourself the expense and overhead selling cost of constantly "digging up" new customers, and losing old customers who are dissatisfied with cheaply made tires?

Or will you put your tire business on the right basis with tires made right — that deliver to the motorist the mileage he is entitled to — that always mean a satisfied user and a repeat sale that costs you nothing to make?

We have the quality kind of tire, and are looking for the right kind of dealer in a few selected territories.

If you are interested in ultimate profits as well as present sales — write or wire us at once.

THE REPUBLIC RUBBER CO.

YOUNGSTOWN, OHIO

Branches and Agencies in the Principal Cities

A New Tire for Small Car Owners

Here is the greatest small car, non-skid tire ever put on the market. The same quality of material and workmanship that go into Republic Staggard Treads, go into the "W M" Tire. It costs less than Republic Staggard Treads, but on Fords and cars of similar type, will give excellent mileage and service.

REPUBLIC MILEAGE

PLAIN AND STAGGARD TREAD

QUALITY · QUALITY · QUALITY · QUALITY · QUALITY · QUALITY

HESS-BRIGHT
Ball Bearings

During the past year we have made very extensive additions and improvements to both our plants, and are now in position to take care of your ball bearing requirements to better advantage than ever before.

We have the largest and most complete plants in the world devoted exclusively to the manufacture of ball bearings.

THE HESS-BRIGHT MANUFACTURING CO.

Main Office and Plant No. 2 on New York Division of Penna. R. R., Front and Erie Avenue, Philadelphia, Pa.

Stores for Retail Distribution:

Philadelphia, 666 N. Broad Street — New York, 1974 Broadway — Chicago, 1800 Michigan Avenue

ROWE MOTOR TRUCKS

are used in every line of business and in every case have proved the most economical means of hauling.

A Rowe Truck will save you money in transporting your merchandise.

The Rowe Truck is guaranteed to give

Continuous Economical Operation

Worm or chain drive. One to five ton capacity

Rowe Motor Manufacturing Co.
Downingtown, Pa.

$500 in Cash Puts the $2000 Selden Truck Into Service

The Truck itself earns the balance of the purchase price. This means that the makers of the Selden Truck know it is capable of giving constant service—know that it will carry its load day after day and save money while doing so.

THE SELDEN TRUCK

is built to give satisfaction. It is bound to be a paying investment to any firm who can use a One-Ton Truck.

The Selden Sales Plan

After the initial payment of $500 the balance is paid in twelve monthly installments of $125 each. Every wholesaler and manufacturer can purchase a truck on this basis without crippling his working capital. It will pay you to investigate.

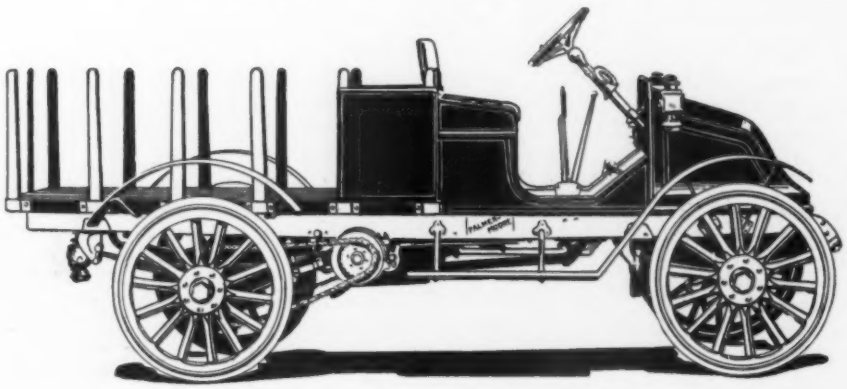
We Want Dealers Who "Know How" to Sell Trucks

SELDEN TRUCK SALES COMPANY
Pioneers in Selling Trucks on Time
217 East Avenue Rochester, N. Y.

PALMER SERVICE PM DEPENDABILITY MOORE
TRUCKS

ATTENTION—LIVE DEALERS

WE WANT TO INTEREST YOU



Palmer-Moore Stake Body

Capacity, 1600 lbs. **Price, $1275**

THE PALMER-MOORE is the truck the live dealer has been waiting for. Here is a truck bristling with good, strong talking points—a truck whose appearance pleases the eye of the purchaser and whose record for dependable service makes it the final choice of the discriminating business man.

Look at the sturdy, well-balanced construction. There is strength in every part and class in every line. Simplicity is the secret of its mechanical efficiency.

We are looking for aggressive dealers everywhere—the kind that know a dependable truck when they see it, and who appreciate good-will and service on the part of the manufacturer.

Standard Express, Stake, Four-Post and Panel Bodies
Special Bodies to Order

Write for further information

PALMER-MOORE COMPANY
SYRACUSE, N. Y.

What Makes a Pop Gum "POP?"

Simply this—the air that is compressed between the plunger and the tight-fitting cork. Cut a groove in the cork and what happens? Why, there will not be much pop. The air will trickle out through that groove so that there will be less compression. Result—less force. Hence, less pop.

The same principle applies to your motor. The piston ring is your cork. The opening in the ring, which enables it to adjust itself, is the groove in the cork. Your power-producing vapor trickles through it. Result—**less** compression,—hence, **less** power,—hence, **decreased** efficiency,—hence, **increased operating cost.**

Seems like a mighty big bill to come from a little groove, doesn't it? Nevertheless it is true. Unavoidable, did you say? Perhaps, once upon a time, **but not now.** Over 150,000 users of motor-driven vehicles have found an effectual way to stop that loss by using

PISTON RINGS

It's very simple when you stop to analyze it. The piston ring must have an opening to permit it being snapped on the piston and to adjust itself to the cylinder wall. Very true, but that opening can be covered. How? did you ask? Here's the answer:

Leak-Proof Piston Rings are made in two pieces. The opening in each piece is directly opposite that of the other. Each piece bears a flange that covers the opening in the other piece. Result—the vapor seeking to escape, figuratively, bumps against a stone wall—it can't get past these flanges!

It's perfectly plain that this will give you better compression; that you will get all the power your vapor can produce; that it requires less gasoline to travel a mile; that your operating cost will thus be reduced.

In a few words, the use of **Leak-Proof** Piston Rings gives you greater efficiency at less cost.

This seems so obvious that you would think everybody would use them. Many do, but some don't. There are three reasons why they don't:

First—some do not know about them. That's why we are talking to you. Second—the first cost is a little greater. Narrow visions cannot see the big ultimate savings on account of the little additional charge. Third—skepticism. It seems too good to be true. "Do they really do it?" they ask. If our logic isn't convincing to them we merely say—

"Ask the User"

HE WILL TELL YOU HOW TRUE IT IS

Why don't *you* investigate them now. They will increase the saving made by using motor trucks

McQuay-Norris Mfg. Company, Dept. C

1309 Chestnut St. **St. Louis, Mo.**

BRANCH OFFICES:

NEW YORK, N. Y. Room 53, Lincoln Sq. Court 64th and Broadway

CHICAGO, ILL. Suite 39, Merchants Bldg. 106 N. La Salle St.

PITTSBURGH, PA. 7630 Tioga St.

KANSAS CITY, MO. 3133 Michigan Ave.

LOS ANGELES, CAL. 822 Central Bldg. 6th and Main Sts.

SAN FRANCISCO, CAL. 268 Market St.

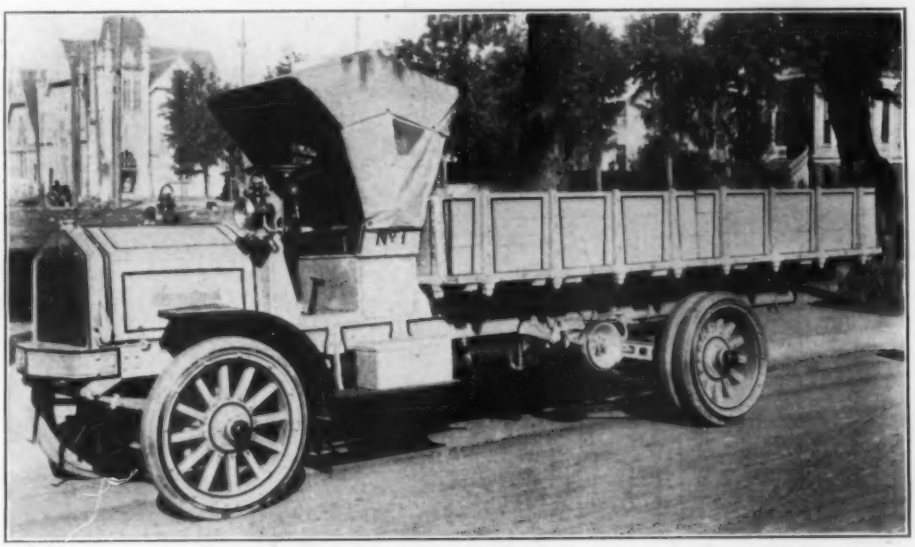
CANADA—W. H. Bowfield, 129 Adelaide St., W., Toronto

STANDARDIZED TRUCKING

Means the REDUCTION of Your Hauling Cost Per Ton Mile to the LOWEST Degree and the CONTINUOUS Maintenance of It on Such a Basis

STANDARD 3 TON TRUCKS

Begin this saving for you with the purchase **Price of $2750.00.** For if (as is usual) you are charging off 25% per annum to depreciation, you have **saved** $250.00 **each** year by owning **"A Standard"** or **$1000 on the Purchase Price.** Again—**"Standard Trucks"** are furnished by us in such a range of wheelbase and loading lengths that we can **"Build the Truck to Fit Your Business."** Comparison will show that we are **alone** in this important matter of meeting **individual** requirements in chassis design.



A "Good Roads" Standard

Standard 3-Ton Truck sold to Los Angeles County, Cal., for the use of the Highway Commission

THE STANDARD TRUCK—CHASSIS, $2750.00 F. O. B. DETROIT

"The ONE Standardized Commercial Vehicle"

Our Catalogue (for the asking) tells the details of construction. **Dealers!** Start that inquiry to us **Today.** Your territory **may** be open.

STANDARD MOTOR TRUCK COMPANY, Detroit, Mich.

Take St. Louis for Instance—

The Anheuser-Busch Brewing Association, of St. Louis, one of the largest breweries in the United States, operates 50 electric trucks equipped with "Exide" Batteries. This is what the company recently wrote regarding "Exide" Batteries:

"We are getting excellent service out of our "Ironclad-Exide" and "Hycap-Exide" Batteries. We are not having any trouble with batteries. We have had very heavy deliveries this past summer and not once did our batteries fail us. We have at this date about 50 of your batteries in service. All I can say will not praise them enough for their excellent service."

The Union Electric Light & Power Co., of St. Louis, Mo., operates 19 electric vehicles, equipped with "Exide" Batteries, 10 of them being "Ironclad-Exide".

The Commercial Truck & Mail Service Co. at St. Louis, which hauls United States mail, has 9 "Electrics" equipped with "Hycap-Exide" Batteries.

The Board of Education of the City of St. Louis, uses 4 electric vehicles equipped with "Ironclad-Exide" Batteries.

The Krey Packing Co., of St. Louis, also operates 4 "Electrics" equipped with batteries of the "Exide" types.

And there are many other commercial "Electrics" as well as hundreds of pleasure cars in St. Louis which use either the "Exide", "Hycap-Exide", "Thin-Exide" or "Ironclad-Exide" Batteries.

75% of all electric trucks in St. Louis are equipped with "Exide" Batteries.

Let us refer you to the owners of "Electrics" in your town, who are using "Exide" Batteries and let us help you in choosing the proper battery for your service.

THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of The "Chloride Accumulator," The "Tudor Accumulator," The "Exide," "Hycap-Exide," "Thin-Exide," and "Ironclad-Exide" Batteries.

New York Boston Chicago PHILADELPHIA, PA. Denver San Francisco Seattle
St. Louis Cleveland Atlanta Detroit 1888-1914 Los Angeles Portland, Ore. Toronto

886 "Exide" Distributors 9 "Exide" Depots "Exide" Inspection Corps

A Clutch That Will Appeal to Truck Manufacturers Designers and Engineers

A clutch has at last been produced which is especially designed for truck and tractor service and which fully meets all the requirements which such service demands. It is known as the

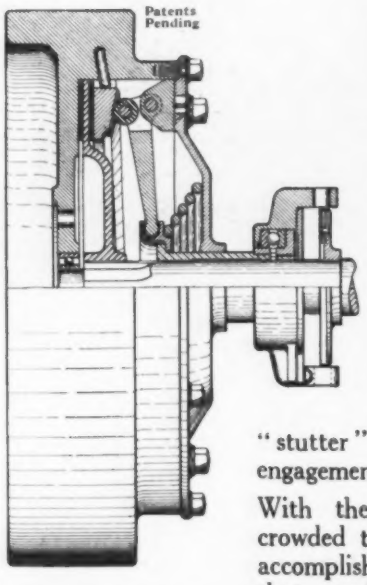


Illustration of Clutch and Flywheel Combined

Borg & Beck

3 Plate Dry Disc CLUTCH

It is built with a light friction disc that will not manifest any drag in releasing. Its construction is such that it will not "grab," "stutter" nor "slip." It has a gradual and positive engagement and is "fool-proof."

With the BORG & BECK Clutch, gear shifting in crowded traffic is done away with, as the same results are accomplished by friction slippage. This is the only clutch that can be slipped indefinitely without damage. Rigid tests prove that this clutch affords

A Real Solution of the Clutch Problem

Its superiority over all other types of clutches now in use is instantly appreciated by designers and engineers who see it in operation.

Produced in any diameter or power required.

Responsible truck, tractor and automobile makers will be furnished with complete data, proof and blue prints upon request.

THE BORG & BECK COMPANY
MOLINE, ILL.

SCHWARZ WHEELS

Safety, Strength, Economy

These are the three vital wheel factors which make SCHWARZ WHEELS without a peer, and the practically unanimous choice of all engineers, designers, and manufacturers who are seeking the highest quality wheels.

Their conceded superiority in safety, strength and economy is due to the manner of their construction.

The ends of the spokes are grooved and mortised and dovetail or interlock, forming a rigid, immovable center assembly which cannot loosen or get out of shape under the most severe strain.

The advantages of this patented construction over the old wedge-shaped spokes held together only by glue, hub flanges, and hub flange bolts is apparent to all who will give the question the slightest study.

SCHWARZ WHEELS cannot run out of true, loosen or be subject to other troubles common to ordinary wheels. They are a quality product that grace nearly all the quality pleasure and commercial cars, and their presence is an assurance of quality.

If you manufacture, sell, or operate a motor vehicle, make sure that it is Schwarz-equipped.

Write for booklet, "Bear the Burden". It is free and worth while.

EXHIBITS AT CHICAGO SHOW

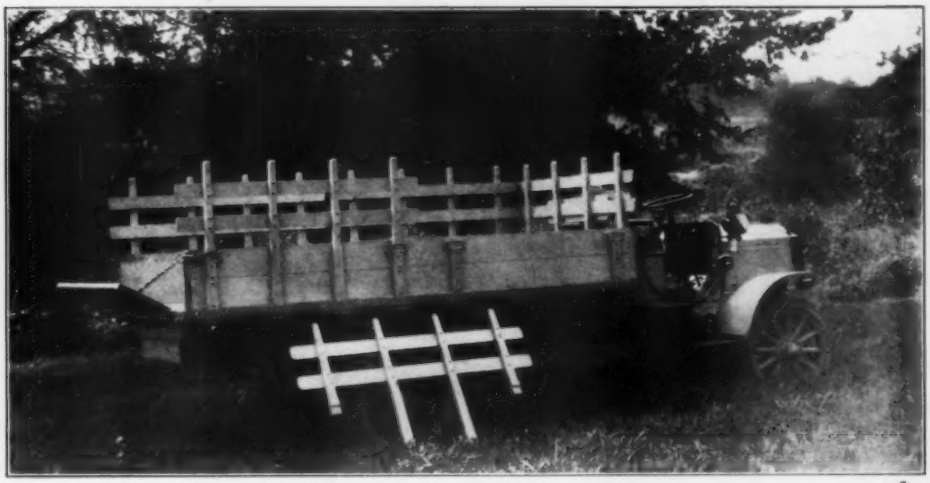
The Schwarz Wheel Co.

Frankford, Philadelphia, Pennsylvania

When Writing, Please Say—"Saw Your Ad. in the C C J"

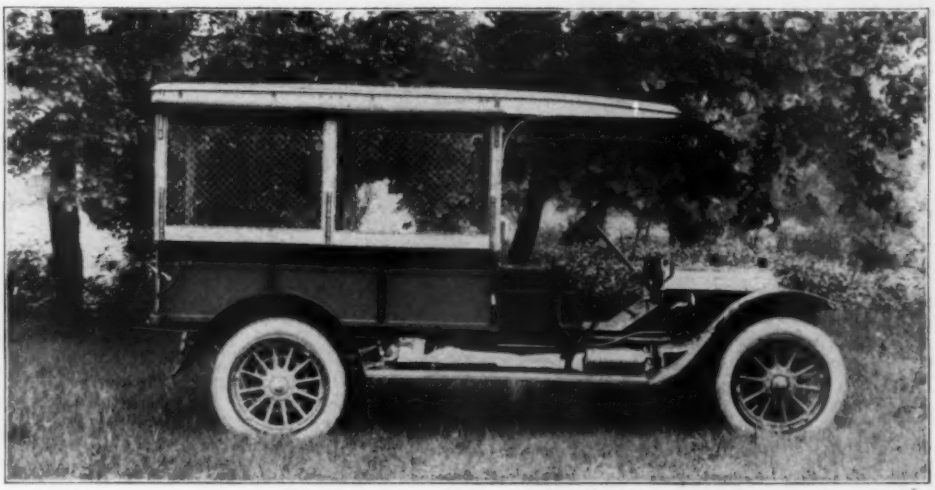
Highland Bodies

A complete standard line for motor trucks



Our line of standard Highland Bodies comprises 38 sizes of Flare-Board Bodies, 27 sizes of Stake Bodies and a variety of Furniture and other bodies. This great array makes it certain that the car builder adopting the Highland Line can always be sure of having

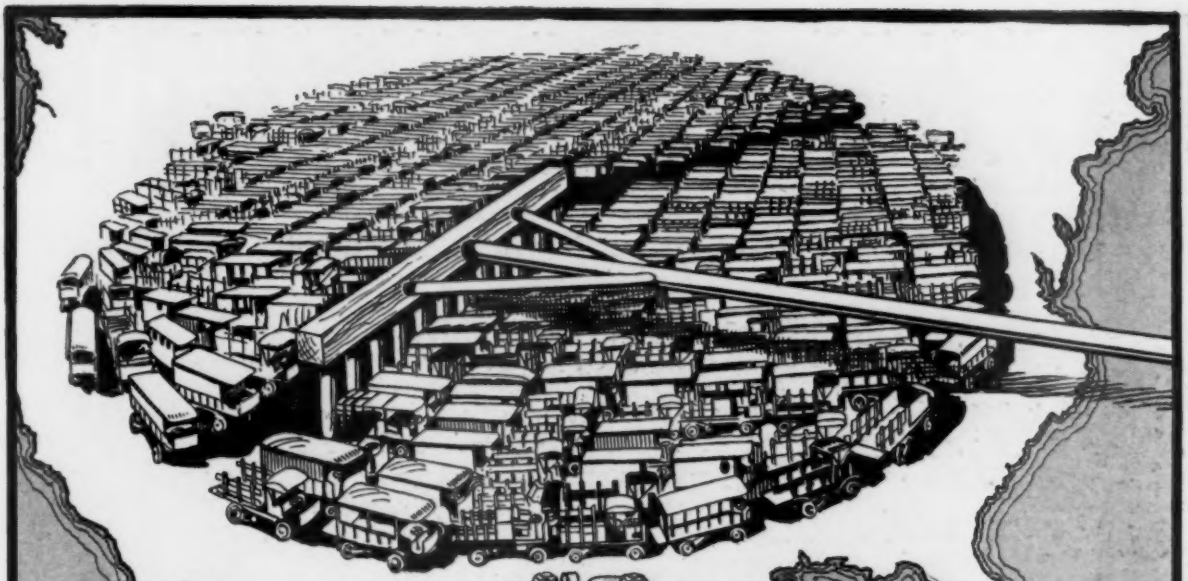
The Right Body for Every Business



We are makers of motor truck bodies exclusively and have specialized on their construction until we are qualified by knowledge, experience, skill, production facilities and a standardization of parts to turn out a better, more serviceable, economical and durable body at a lower cost than you would pay elsewhere for mediocracy. The bodies are designed by engineers, are made of the very best materials and afford the maximum strength for the least weight.

Let us quote on your 1914 requirements

The Highland Body Manufacturing Company
Cincinnati, Ohio



Edison

ONE 3 THIRD

OF ALL THE ELECTRIC TRUCKS
AND DELIVERY WAGONS IN THE COUNTRY
ARE *EQUIPPED WITH* THE

EDISON STORAGE BATTERY

Five years ago we entered the race—against competition of ten to fifteen years standing. TO DAY WE WIN

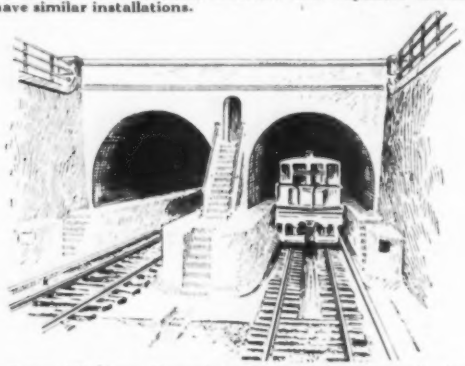
EDISON STORAGE BATTERY CO., 141 LAKESIDE AVE. ORANGE, N. J.

When Writing, Please Say—"Saw Your Ad. in the C C J"

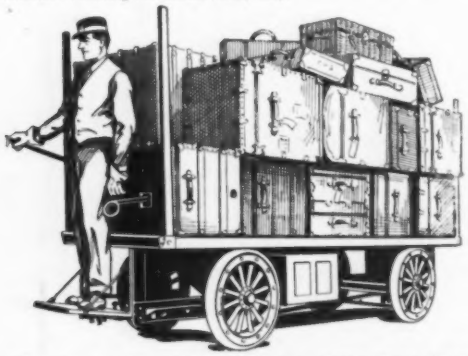
GOULD VEHICLE BATTERIES

Chemically Powerful Mechanically Strong

The fully charged Gould Storage Battery of a submarine vessel in our navy has enough power to drive 130 automobiles 100 miles. The Russian, Austrian and Japanese navies have similar installations.



Every Michigan Central train that goes through the Detroit River Tunnel depends upon a Gould Storage Battery for power. This battery is large enough to keep 300 automobiles running 100 miles every day.



Baggage on the station platforms of the Pennsylvania Railroad and Grand Central Terminals, New York, is handled on trucks driven by Gould Vehicle Batteries.

Gould *Vehicle* Batteries were designed by the same brains and with the same facilities that made the Gould triumphs indicated by illustrations herewith.

The strong friendship of experienced electric vehicle users for the Gould Battery comes from the economical and dependable service assured by our simple construction and by our provision for continued high electrical capacity.

The Gould positive plate construction produces high energy output per unit weight of battery, and does so through the use of a *hard* oxide composition that absolutely prevents the troubles common to the usual *soft* paste composition. The active particles, being better bound into the plate, *must* do maximum work before shedding, especially that only a thin surface layer, instead of the whole mass of oxide, becomes active to produce full electrical capacity. *Much longer plate life* is thus secured through slower natural wear, immunity to shedding from jarring and vibration of the vehicle, and less harm from too long or too rapid charging.

This has been proven time and again where Gould plates have been used for renewals in batteries of other make. Almost invariably renewal with Gould plates increases the service radius of a vehicle and cuts maintenance cost to the low limit.

AN AGENCY OPPORTUNITY FOR DEALERS and CHARGING STATIONS

Gould Vehicle Batteries and renewal plates (which fit jars of any make) quickly establish a reputation which makes subsequent sales come easy. Our liberal treatment of customers further tends to play into our representatives' hands and makes an agency for Gould Batteries extremely desirable. Our proposition would enable you to make good money. Ask for particulars.

Gould Storage Battery Co.

General Offices: 30 East 42nd St., New York City. Works: Depew, New York

BOSTON—89 State Street
PHILADELPHIA—613 Betz Building
CLEVELAND—American Trust Bldg.
DETROIT—Boyer Building
CHICAGO—The Rookery
SAN FRANCISCO—904 Rialto Bldg.

AGENTS: Topeka, Los Angeles, Seattle.
Canadian Representative: R. E. T. Pringle, Montreal, Toronto, Winnipeg, Vancouver

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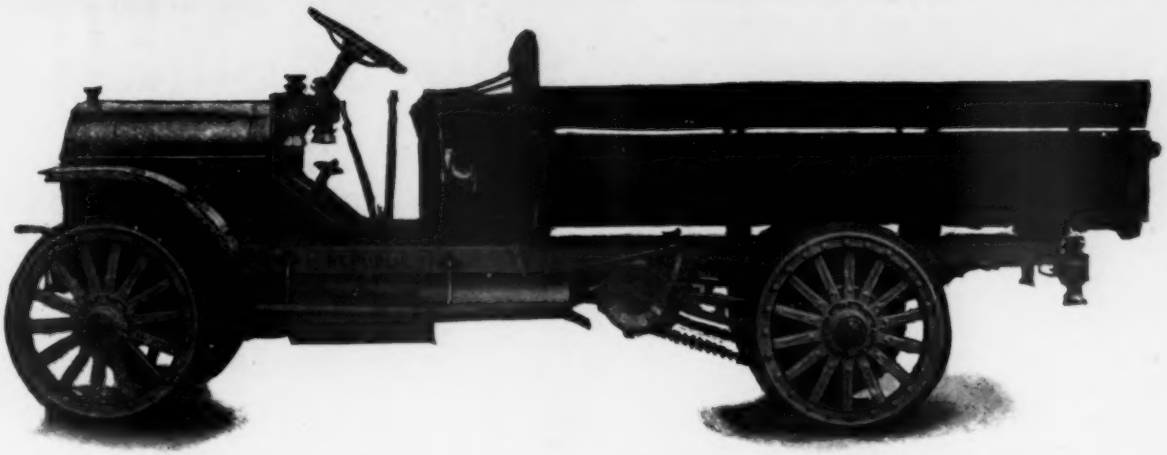
REPUBLIC MEANS SERVICE



$1425—Republic 2000 lb. Truck, Fitted With Standard Express Body—$1425

DEALERS—You will recognize these specifications as "Standards" in motor truck construction

The motor trucks of today that are giving real service and dollars and cents satisfaction to their owners are made of "standard" parts.

Every unit that enters into the construction of the Republic Truck is built by a specialist and backed by the guarantee of the maker.

Each manufacturer is recognized as making the best article in his field and the Republic is built up from these selected units.

Just think what this means to you and to your customers to know that the different parts of the truck are backed by these immense organizations as well as by the Alma Motor Truck Company.

In addition to this you have a 2000 pound truck built as strongly and using some of the same units that are used in the most successful 1½ to 2-ton trucks made today and at the price of $1425.

Write or wire today for complete information about our selling plan

SPECIFICATIONS:

Continental Motor	Hyatt Roller Bearings	Covert Transmission
Schebler Carburetor	Hartford Joints and Clutch	Lewis Springs
Eisemann Magneto	Culver-Taylor Chains	Left-Hand Drive
Russel Jack Shaft		Center Control

Capacity, 2000 lbs. Body, Stake or Express. Price, $1425

ALMA MOTOR TRUCK CO.

Factory, Alma, Mich. General Sales Office, 870 Woodward Ave., Detroit, Mich.

Export Office, 17 Battery Place, New York

SERVICE STATIONS: 5129 Evanston Ave., Chicago, Ill.; Pico & Hill Sts., Los Angeles, Cal.; 571-77 S. Clinton St., Syracuse, N. Y.; Mignonette & Beatty Sts., Pittsburgh, Pa.; 215 W. 4th St., Columbus, Ohio.

KOEHLER

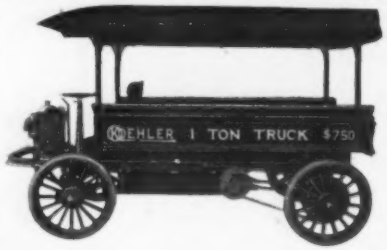
ONE TON TRUCK $750.

DEALERS: With this truck at this price you are in a position to dominate the light truck field in your territory. No competitor can offer such value and capacity at this price. It's a great truck to sell because it's low in price, economical in operation, simple in construction, efficient in service. You can make money with it. Others have made big money—want proof?

24 H. P. Motor
"L" Schebler Carburetor
Bosch Magneto
2-inch Axles
36-inch Demountable Tires
90-inch Wheelbase
Positive Lubrication

Ten Stock Body Types

Write for full details and state territory desired.



H. J. KOEHLER S. G. COMPANY
1709 BROADWAY, NEW YORK

"Kells Patent" Truck Radiators

Guaranteed Absolutely Non-Leaking

Not experiments, but radiators of assured merit, built by pioneers in the Radiator field for the past twelve years.

Used on Mack, Knox, Croce and many other trucks.

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Repairing of All Kinds on Short Notice

W. J. KELLS MFG. CO.
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Veeder
HUB ODOMETER

FORM K
$20

This is the little detective which, placed on your trucks, keeps you accurately informed of just what that truck is doing.

By means of its infallible, incorruptible, unchangeable records you can tell exactly which of your trucks are economical and which are not, and why.

It will tell you which of your drivers are doing careful, conscientious work, and which are soldiering on the job.

It gives you absolutely accurate mileage records upon which to base your cost figures. Without such records, cost sheets are worthless.

The proof of the effectiveness and economy of your delivery system lies in this little instrument and it is of considerable importance to you that it is unfailingly exact in its reports; that it records both backwards and forwards; that its records cannot be altered; that there is no way in which a dishonest driver can get around its plain statement of the truth, the whole truth and nothing but the truth.

This is not true of most recording instruments, and that is but one reason why you should select the VEEDER as the basis of your cost records. Write us for catalog "D" giving the whole VEEDER story

At your dealer's or direct from the factory.

The Veeder Manufacturing Company
C. H. VEEDER, President D. J. POST, Treasurer
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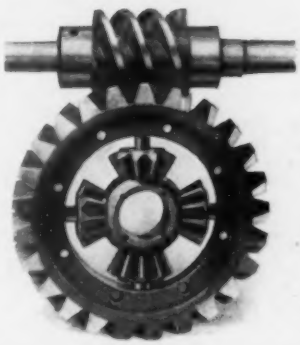
HARTFORD, CONNECTICUT

Makers of Cyclometers, Odometers, Tachometers, Tachodometers, Counters and Small Die Castings

HINDLEY
Worm Gear Axle

The Modern Drive for Commercial Trucks .·. Safe, Silent, Efficient

By increasing the length of service and decreasing the cost of upkeep it has proved itself to be the ideal drive for heavy-duty motor trucks. It does away with the annoyance and expense of broken chains, and maintains high efficiency. Runs in oil, is noiseless, dust and trouble-proof.



Our engineering department and over half century of experience in gear cutting is at your disposal in adopting this modern drive. Write us today for further information.

The Hindley Gear Company
1105 Frankford Avenue
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in colors should be included in every advertising campaign

Your prospective customer *may* see your catalog or magazine advertisement, but he is sure to read your CHILTON POST CARD.

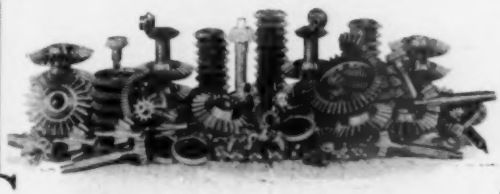
The use of the post card in colors is the modern way to advertise and economize. It is a *personal-appeal* form of publicity which invariably attracts attention, and is sure to land orders.

Forward us your printed matter, state what you want to advertise and how many cards you can use, and we will do the rest.

CHILTON COMPANY

Market and 49th Streets PHILADELPHIA, PA.

—GEARS—



GEARS GEARS

Bevels Mitres Worms
Spurs Spirals Racks
Sprockets

We produce in quantities to specification cut and planed Gears and Pinions of all descriptions. As a source of supply in connection with *Gears* and *Gear Cutting*, we are considered an asset by many of the best interests. They buy from us year after year, because these advantages are afforded:

(1) *Unexcelled facilities.*
(2) *The highest standard of workmanship.*
(3) *Years of experience as specialists in gearing.*
(4) *A most careful selection of materials.*
(5) *Particular attention to deliveries.*

THE VAN DORN & DUTTON CO.
Gear Specialists
CLEVELAND (Sixth City)

—GEARS—

—ACME—
Universal Joints

These are the best universal joints that a truck manufacturer could put in his product. They embody every essential feature necessary to make it the nearest perfect Universal Joint for use in trucks.

ACME JOINTS are remarkable for their simplicity and durability and are best adapted to withstand the severe wear and strain to which they are subjected in motor truck usage.

The ACME can be removed from a car without moving a unit of the power transmission. This feature alone gives it a great advantage over any other joint on the market.

They are so accurately made that they are interchangeable and necessary repairs can be made without difficulty.

Ask us to prove that Acme Joints are better than those you are now using—we'll do it.

The Acme Universal Joint Mfg. Co.
1421 Fulford Street, Kalamazoo, Mich.

Motor Truck Bands

MADE WITHIN THE FOLLOWING

Dimensional Tolerances

(ADOPTED BY THE SOCIETY OF AUTOMOBILE ENG.)

1.—Tolerance in circumference of felloe band:

	Plus	Minus
Before application to wheel - -	1-32"	1-32"
After " " " - -	1-16"	1-32"

Variation from precise measurement shall be uniform over entire width of band.

2.—Tolerance in width of felloe band:

	Plus	Minus
Up to and including 4" - - -	1-32"	1-32"
4—1-16" to 6" - - - - - -	3-64"	3-64"
6—1-16" to 12" - - - - - -	1-16"	1-16"

3.—Variation in trueness of band when placed on surface plate: Band shall touch at all points within 1-32" up to and including 6" width. Over 6" width within 1-16".

4.—Variation in thickness of band: .006" plus or minus.

5.—Trueness to round. The radial tolerance on the wheel when felloe band is applied shall be 1-16" plus or minus. This plus or minus tolerance must not occur at diametrically opposite points. There shall be no flat spots or kinks in felloe band on the finished wheel.

The Standard Welding Company
CLEVELAND
NEW YORK CHICAGO DETROIT

Hayes Wheels

Our motor truck department is equipped with the latest improved and specially designed machinery, and with an experienced, capable organization, to turn out the best wheels ever made for motor trucks.

Hayes quality is known from ocean to ocean. **Hayes Wheels** are used, among others, by these leading automobile and truck manufacturers:

Studebaker	Standard Motor Truck
Detroit Electric	Federal
Garford	Speedwell
Imperial	Cadillac
General Motors Truck	Sandow
Brown Commercial Car	Gramm
Chalmers	Woods
Columbia	Moon
Maxwell	Regal
Rambler	Packard
Overland	Mogul
Jackson	Elkhart

SUBMIT YOUR SPECIFICATIONS
TO US FOR QUOTATIONS

HAYES WHEEL CO. :: Jackson, Mich.

International Harvester Motor Trucks

Good business? Of course it's good business to install motor truck delivery. If you are handling horses or trucks; if you own and use horses; if your deliveries require speed or much light hauling, it will pay you to buy and use International Harvester motor trucks—one for a small business and a fleet of them for a large one.

This truck will do the work it is sold to do. Eight years of success back up that statement—eight years devoted to the development of one chassis through experiments with all kinds of street, road and loading conditions in more than one hundred different kinds of business. This record together with the responsibility and standing of the company behind the truck is the best guarantee of satisfaction you could get.

The International Harvester motor truck has a rated capacity of one-half ton, and a 20 H. P. engine furnishes ample power to drive the truck over any road, up any hill. Any desired style of body can be furnished. Bodies can be changed in a few minutes. In economy of running and in low up-keep cost the International Harvester motor truck leaves nothing to be desired. Write for full information about this steady-running, dependable truck. Address the

International Harvester Company of America
(Incorporated)
182 Harvester Building Chicago U S A

This is the

"Jasco Tank"

¶ It is made absolutely seamless and leakless, of drawn steel, thoroughly tinned and tested. It is

THE SAFETY GASOLENE RECEPTACLE FOR THE AUTO

¶ It not only insures the safety of the car and its occupants, but stops the constant drain on pocketbooks caused by waste of gasolene. Made in all standard styles and sizes.

JANNEY, STEINMETZ & COMPANY

MAIN OFFICE: PHILADELPHIA, PA.
NEW YORK OFFICE: HUDSON TERMINAL BLDG.

GOODYEAR
AKRON, OHIO

Motor Truck Tires

We make, to supply an immense trade, seven types of motor truck tires—a tire for every service.

Under certain conditions you want **block** tires on rear wheels. Note in Goodyear Block Tires, **each block has its own, individual fastening.** Thus you can remove a single block without disturbing a half dozen others—or more.

We make a Solid Demountable Tire which is not only marvelously easy to **remove,** but which **can't creep.** This is accomplished by our split ring which automatically adjusts to all irregularities in tire or rims. Has hard metal sub-base, hard rubber base, soft rubber tread. All perfectly unionized. Thus we secure unusual wear at base as well as tread.

The Goodyear Side Flange Quick Detachable is a solid tire for trucks up to two tons. The ever occurring problem of preventing creeping has been completely solved by means of diagonal cross wires in the base. It is never necessary to shellac this tire to the rim.

Our seven Truck Tires are illustrated and completely described in our Motor Truck Tire Catalog.

The Goodyear Tire & Rubber Co.
AKRON, OHIO

Toronto, Canada London, England Mexico City, Mexico
Branches and Agencies in 103 Principal cities.
Write us on Anything you Want in Rubber.

The
Motsinger
Carburetor

having but one adjustment, is as simple as a carburetor can be made to give satisfactory service and meet the many changes in temperature to which it is subjected.

On a truck, simplicity, efficiency and economy are important.

All three are found in THE MOTSINGER

Put one on your truck

Motsinger Device Mfg. Co
962 Miami St.
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THE Detroit ELECTRIC

COMMERCIAL VEHICLES

ANDERSON ELECTRIC CAR COMPANY

DETROIT MICHIGAN

The demand for bearings that will not crush under load has given HYATT ROLLER BEARINGS a big lead over all other types.

The flexible principle is a thoroughly tested feature and enables the bearing to withstand sudden shocks and strains and meet successfully the conditions encountered in automobile construction.

Perfect lubrication is made possible by the right and left spirals which distribute the oil evenly over the entire surface of the bearing. Grit and dirt are positively arrested and carried to the inside of the roller. These features insure long life to the bearings.

Our Engineering Department will be glad to go over your plans with you.

Hyatt Roller Bearing Company
Detroit, Michigan

B. A. Gramm's Motor Trucks

Newest Designs, Latest Improvements; Built in every detail to insure satisfactory and permanent results.

Write for photographs, descriptive literature and the exceptional values we offer you—far beyond all others.

The Gramm-Bernstein Co.
Exclusive Motor Truck Builders
Lima, Ohio, U. S. A.

USE KEROSENE

CUT YOUR FUEL EXPENSE IN HALF

WITH THE

G. C. VAPORIZER

It **runs any motor on kerosene** and the cheaper fuels **better** than on gasoline, and operates **without carbon, odor** or **smoke.**

Every truck owner and user should learn all about this extraordinary motor improvement by sending for our booklet,

"Use Kerosene as Fuel"

G. C. Vaporizer Company of America, Inc.
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The Commercial Car Journal

is the logical paper for every man to read who contemplates buying or selling commercial motor cars.

It is brimful of essential information.

The Commercial Car Owner will also find many suggestions in it that will make his driving more efficient.

Send for a sample copy.

Commercial Car Journal
Market & 49th Sts.
Philadelphia, Pa.

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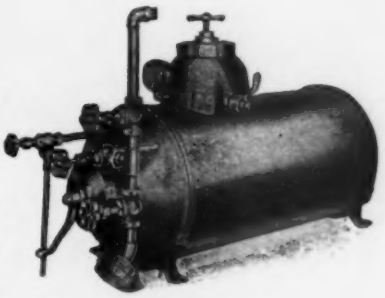
3-Gallon Approved Extinguisher

Chemical Fire Apparatus

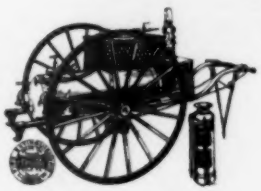
HAND EXTINGUISHERS and TANKS

of every description for department apparatus. We are equipped to make tanks of any size or type.

We also provide a complete line of Chemical Engines, mounted on wheels for service in factories, towns, villages, etc. Hose Reels, Hose Axles, Ladders, Hooks, etc.



35-Gallon Copper Tank



We can equip any chassis complete with body, chemical apparatus, etc. ***Ask us.***

O. J. CHILDS CO.

48 Liberty Street
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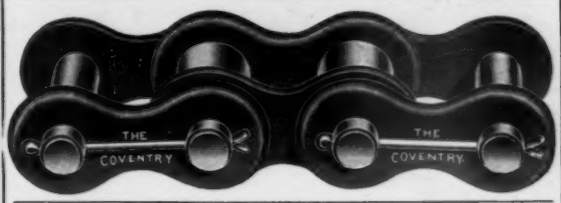

"The Coventry"
Detachable Roller Chain

Note the large heavy-duty cotter-pin connecting the two rivets. The mechanical superiority of this method of coupling can easily be appreciated. Vibrations and jars cannot weaken the double-size coupling as is the case where two smaller cotter-pins, one for each rivet are employed.

Combine the established reputation of "The Coventry" Chains for precision, perfect retention of pitch and unparalleled durability with this final touch of perfection and you will understand why "The Coventry" Chains are consistently specified by those desiring the maximum of transmission efficiency.

Our catalog comprehensively covers "The Coventry" line, and will be sent immediately upon request.

Herbert F. L. Funke Co., Inc.

Dept. V 116 Broad Street New York

REMY

World's largest Manufacturers of Ignition

THE best authorities agree that your truck investment will not be profitable unless the service is continuous. The one and only way to guarantee continuous service is to guarantee 100% efficient ignition with the famous Remy Magneto.

Remy Electric Company

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Service Stations Throughout the Country

AMERICAN - MADE - FOR - AMERICAN - TRADE

New Departure

GUARANTEED

Ball Bearings

To facilitate supplying demand of garages, dealers and owners for New Departure Ball Bearings, the following distribution agencies are announced, where stock of these bearings is carried:

Ahlberg Bearing Co.,	93 Massachusetts Ave.,	Boston, Mass.
Pruyn & Bilodeau,	1550 River St., Hyde Park,	Boston, Mass.
Ahlberg Bearing Co.,	1790 Broadway,	New York City
Jos. C. Gorey & Co.,	352 W. 50th St.,	New York City
The Gwilliam Co.,	Broadway & 58th St.,	New York City
Pruyn & Bilodeau,	1876 B'way, cor. W. 62d St.,	New York City
Albany Hardware & Iron Co.,		Albany, N. Y.
Syracuse Rubber Co.,	212 S. Clinton St.,	Syracuse, N. Y.
Iroquois Rubber Co.,	279-283 Washington St.,	Buffalo, N. Y.
Rochester Rubber Co.,	24 Exchange St.,	Rochester, N. Y.
The Gwilliam Co.,	1314 Arch St.,	Philadelphia, Pa.
Bumiller-Remelin Co.,	432 Main St.,	Cincinnati, Ohio
Cray Bros.,	1111 W. 11th St.,	Cleveland, Ohio
Hearsey-Willis Co.,		Indianapolis, Ind.
Machinists' Supply Co.,		Pittsburgh, Pa.
Ahlberg Bearing Co.,	2637 Michigan Ave.,	Chicago, Ill.
Chicago Pulley & Shafting Co.,	32-36 S. Clinton St.,	Chicago, Ill.
Herring Motor Supply Co.,	912-14 Locust St.,	Des Moines, Ia.
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The Lininger Implement Co.,	Sixth & Pacific Sts.,	Omaha, Neb.
Denver Auto Goods Co.,	1600 Broadway,	Denver, Col.
Fry & McGill,	16th & Broadway,	Denver, Col.
M. L. Foss,	1729 California St.,	Denver, Col.
Bertram Motor Supply Co.,	251 S. State St.,	Salt Lake City, Utah
J. W. Leavitt & Co.,	301 Golden Gate Ave.,	San Francisco., Cal.
Irvin Silverberg & Co.,	541 Van Ness Ave.,	San Francisco, Cal.
Kimball-Upson Co.,	609-11 K St., 608-15 Oak Ave.,	Sacramento, Cal.
Western Rubber & Supply Co.,	1011 S. Olive St.,	Los Angeles, Cal.
Western Rubber & Supply Co.,	66 S. Fairoaks Ave.,	Pasadena, Cal.
Western Rubber & Supply Co.,	1364 Fifth St.,	San Diego, Cal.
Ballou & Wright,	7th and Oak Sts.,	Portland, Ore.
Ballou & Wright,	817 E. Pike St.,	Seattle, Wash.
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BUCKEYE Motor Truck Jacks

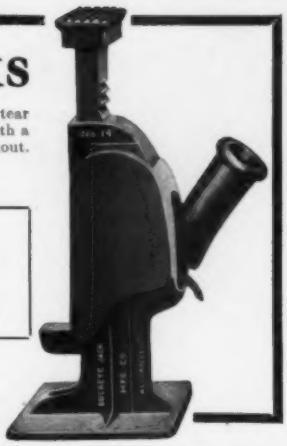
Buckeye Motor Truck Jacks are safe, reliable and made to stand the wear and tear for which they are intended. They are fully guaranteed, and cannot possibly drop with a load. They are made from Steel Drop Forgings, best finish and workmanship throughout.

Get our prices before you place your orders for jacks, we can save you money.

No.	Height Bar Down	Raise of Bar	Height Bar Up	Weight	Capacity		List Price
7	11¼″	6½″	18″	16 lbs.	2½ tons	with formed handle	$10.00
13	14¾″	7½″	20½″	26½ "	3 "		15.00
14	14¾″	7½″	20½″	33 "	5 "		16.00
9	11½″	6″	17½″	10 "	1½ "		6.00

Write today for descriptive catalog. Made only by

THE BUCKEYE JACK MFG. CO., Alliance, Ohio



Let Us Solve Your Lubricating Problem

We specialize on Commercial Car Lubricants and will be glad to place at your disposal all the experience and knowledge we have acquired in twenty-five years of successful oil business as a means of finding the correct solution to your lubricating problems.

We have special lubricants for Worm Gear, Shaft and Chain-Drive Trucks, and can satisfactorily meet any requirement.

Call on us for assistance at any time.

W. S. Sheppard, 23 Lawrence Street, Newark, N. J.

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Welding and Decarbonizing Apparatus

Send for full information and illustrated catalog

COX BRASS MANUFACTURING CO., Albany, N. Y.

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THE PARISH & BINGHAM CO.
CLEVELAND, OHIO

WE HAVE MADE DURING JULY, 1912 TO JULY, 1913
340,890 FRAMES
OF ALL SIZES FOR 105 CUSTOMERS

DeKALB

The DeKalb Two Ton Truck

Every DeKALB built gives continuous and satisfactory service. To do this we have the best engineering skill to design a truck that shall be characterized by efficiency, economy and durability; used the highest grade of materials; employed the best workmanship; and incorporated in it standard parts whose reputations are in themselves a guarantee of quality.

Knowing the excellence of the product, we offer the DeKALB as a motor truck that will meet every requirement at all times, regardless of weather and other obstacle-presenting conditions.

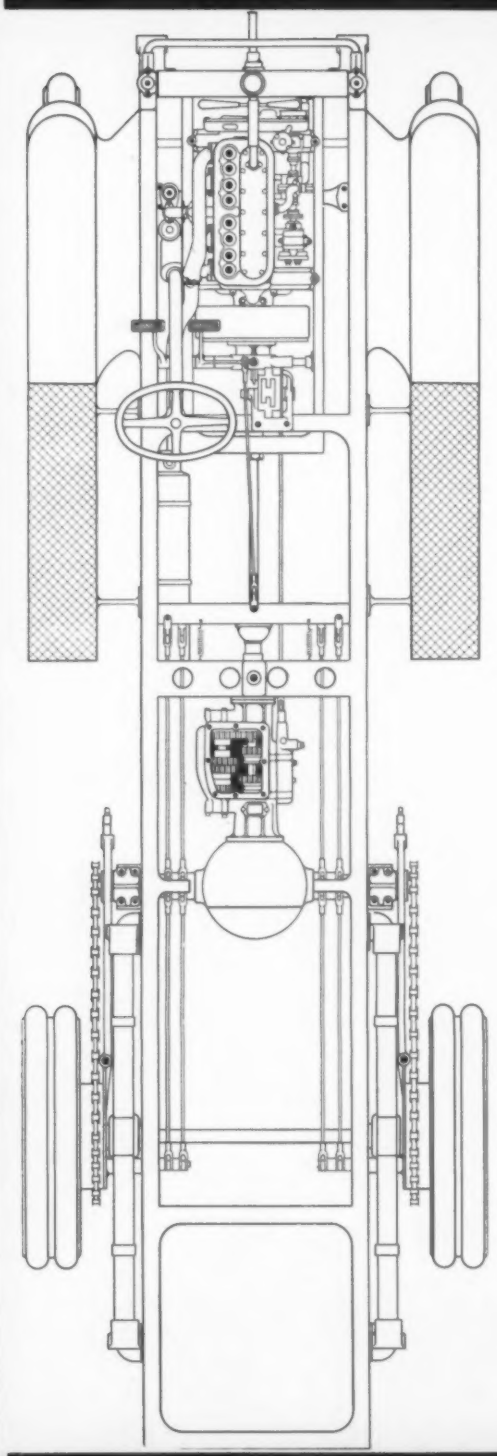
The DeKALB possesses those qualities most desired by buyers of motor vehicles. It is a steady, consistent performer. Its cost of operation is low. It is so well built that repairs and replacements are seldom required,—hence maintenance expense is slight. Its quality is so high and construction so simple that the truck possesses a remarkable durability—a point of great moment to the prospective buyer.

In short, the DeKALB is a truck giving such excellent service and making such pronounced savings that when an additional truck is needed the DeKALB is certain to be the one given serious and favorable consideration.

DeKalb Wagon Company

DeKalb **Illinois**

DeKALB



Plan View of the DeKalb "D=2" Truck

This will give at a glance a comprehensive understanding of the practical and economy-producing arrangement of the chassis. We ask you to particularly note these features and specifications:

Three-point suspension of the transmission and differential housing.

Three-point suspension of the motor subframe.

Spring suspension of the radiator, eliminating vibration.

Left-hand drive, center control.

Two sets of brakes, both operating on rear wheels.

Dual rear tires, giving double traction and, consequently, greater power; demountable rims.

Radius rods extra heavy, eliminating all possibility of trouble.

Neat and compact design, with parts fully protected.

Motor under hood and easily accessible.

Pressed-steel frame, unbreakable.

Continental Model C, four-cylinder, vertical "L" head type.

Cylinders cast en bloc, 4⅛" x 5¼"; rated at 30 H. P., or capable of producing 42 H. P.

Bosch high-tension magneto, fixed spark.

Stromberg carburetor, latest design, 1¼".

Steering gear of non-reversible, worm-gear type.

Timken axles and roller bearings.

Clutch is of special cone type, leather-faced, spring-equipped; fitted with special clutch brake.

Differential and jack shaft of special design, possessing features of marked advantage.

Semi-elliptic springs, front, 45" x 3"; rear, 48" x 3".

Wheelbase, standard, 136"; 144" optional.

Tread, 56". Capacity, 4000 lbs.

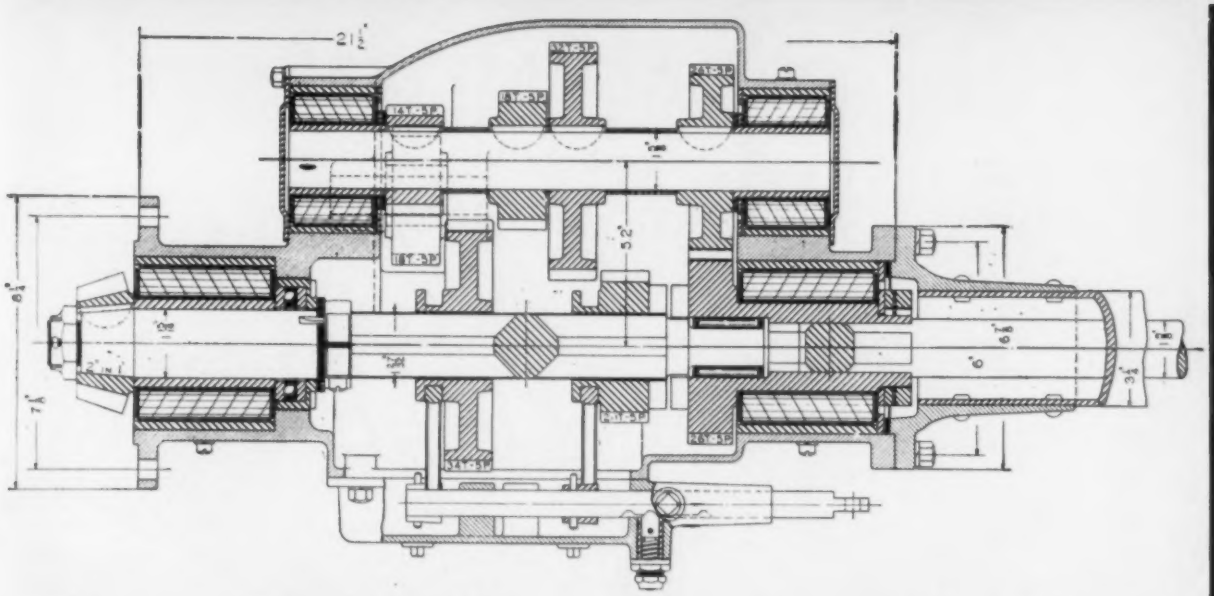
Equipment: Cushioned seat; side and rear oil lamps; horn, and complete set of tools in tool box.

Body—wide range of optional bodies to meet any requirement.

Price—either chassis—finished in the lead, $2600 f.o.b. DeKalb.

DeKalb Wagon Co.

DeKALB



The DeKalb Transmission

We select this for detailed description simply as a representative part. Its quality is matched by the other parts in the DeKALB.

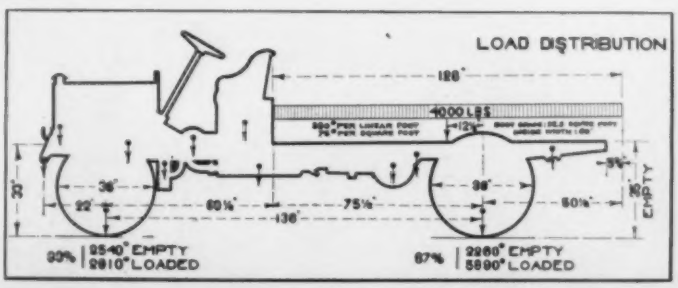
Transmission

The Transmission is the sliding-gear type, selective drive, with three forward speeds and one reverse, direct drive on third speed. A single operating lever controls all gear shifts, and any speed gear may be meshed without passing through other speeds. Gears are of nickel steel, carbonized, heat-treated and accurately ground to fit shafts and receive bearings. The shafts are of nickel-steel, heat-treated and ground to limits of one-half thousandths.

Hyatt high-duty roller bearings are used throughout. The rollers are nickel-steel, heat-treated, accurately ground. The linings are solid steel, hardened and ground inside and out. The case is of a neat, compact design.

Load Distribution

This illustration shows how well the load is distributed in the DeKALB; 33% of the weight comes on the front axle, 67% on the rear.



DeKalb, Illinois

DeKALB

DEALERS!

It's Safe to Sell This Truck

In selecting a motor truck to sell there are two sets of factors to be given careful consideration.

First: the truck itself—its quality, economy, efficiency, durability, appearance, capacity, price.

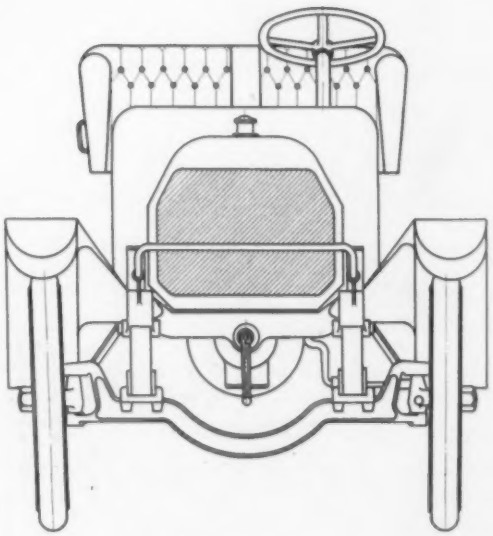
Second: the company producing the truck—its reliability, reputation, financial standing, producing capacity, experience and organization.

The best truck made is not a safe one to handle, if it is not backed up by a sound company, able to redeem its promises.

The strongest company existent is not safe to tie to if it does not produce a truck having sufficient quality to induce repeat orders.

It is safe to sell the DeKALB, because it is strong in both factors. The truck is distinctly a quality production of proved efficiency, economy and durability. Its appearance is an asset. Its capacity is that most desired. Its price is right.

The company producing the DeKALB is a long-established one with a high reputation, unquestioned financial standing, ample producing capacity, rich experience in the transportation field and a capable organization. The concern has stability and a reputation for quality and fair dealing to maintain, and you know you are not representing a hastily organized here-today-and-gone-tomorrow company that may discontinue and leave the dealer with nothing to realize for services performed.



The DeKALB is a safe truck to sell, because it makes good in service. The DeKalb Wagon Company is a safe one to represent, because, it has the disposition, capital and resources to back up its product to the limit.

You can sell this truck and do a profitable and constantly increasing business. Write us for our selling plan and territory.

DeKalb Wagon Co., DeKalb, Illinois

Chicago Sales Office, 1532 Michigan Ave.

Swinehart

Cellular Truck Tires

Most resilient solid tire made. Absolutely non-skid. Increases traction and eliminates undesirable slipping and friction. Does away with the use of chains. The holes in the tire act as a radiator, preventing excessive heating and internal friction. The extra large surface of the Swinehart tread reduces the pressure per square inch to a point well within the safe and economical limit.

The wonderful elasticity, due to the combined use of our cellular design and the highest grade of rubber, allowing the tire to "give and take," to stand the road shocks without damage, is the true secret of Swinehart longevity. Demountable Quick Attachable.

We also make a full line of smooth tread and block tires, single and dual.

THE SWINEHART TIRE & RUBBER CO.
AKRON, OHIO
Boston Branch, 727 Boylston Street

A Strong Plug for Heavy Work

You can't expect a brittle Spark Plug to stand the strain and jars of your motor truck. Plugs insulated with porcelain, mica, etc. are bound to break.

HERZ PLUG

"Bougie Mercedes"

is an exquisite combination of STONE and STEEL. It is made to stand up, and it does. Its insulation is

Double Unbreakable Stone

It is Blue Enameled. HERZ PLUG has Four Sparking Points of Platinum-alloy, which ensure a fat, hot spark at all times. It is Self-Cleaning and

Guaranteed a Full Year

HERZ & CO. - - - - - New York
Makers of the HERZ MAGNETO

Make your motor truck as easy to handle and as economical in upkeep as a pleasure car, by installing

SIMPLE—STURDY—ACCESSIBLE

Dyneto-Entz

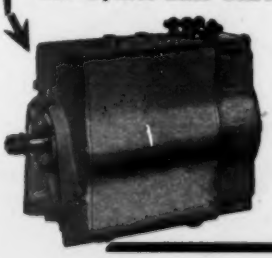
TRADE MARK

Electric Starter and Lighting System

Don't expect your driver to break his back cranking a big engine. He would rather let the motor run from morning till night. **You pay for gasoline—he doesn't.** When your truck stalls on the road or in traffic, think of the time it takes the driver to get under way again.

Give Your Truck Driver the Dyneto-Entz Starter

The truck manufacturer can make room on any new car for the Dyneto-Ents. On an old car a garageman or mechanic can find room for the Dyneto-Ents. One Switch does away with all other controls. A single unit motor generator not only starts the engine every time, but keeps the storage battery charged. The storage battery can not be overcharged. The wiring is simple.



The Dyneto-Ents means that you never have a Stalled Car. Standard Equipment on Franklin, White, Tribune, Stewart, Chase and Other Cars.

Write for Full Particulars

Dyneto Electric Co.
Dept. M SYRACUSE, N. Y.
Sales Agent: T. J. WETZEL, 17 W. 42nd Street, New York City

Alloy and Special Open-Hearth

STEEL

Uniform in Quality

CROSS-ROLLED
(*United*)
PROCESS

Bars. Billets.
Slabs. Blooms.

Write us for prices

THE UNITED STEEL COMPANY
NEW YORK
CHICAGO
DETROIT
CANTON
OHIO

Your Drivers Can Change United States Motor Truck Tires

United States Motor Truck Tires are long service tires. If you use them you will find changes rarely necessary. But when a tire must be replaced your men can easily and quickly make the change either in your own garage or on the road.

Equip your trucks with **United States Motor Truck Tires.** Cut operating costs by gaining mileage, eliminating expensive delays, and reducing repair bills.

Branches in all the principal cities.

UNITED STATES TIRE CO.

Broadway at 58th Street
NEW YORK CITY

ROSS
STEERING and DIFFERENTIAL
GEARS
are standard on good motor truck construction

WRITE FOR CATALOG

ROSS GEAR & TOOL CO.
790 Heath St. :: Lafayette, Ind.

FEENY

Universal Joint
Has the "Strength of Gibraltar"

This **JOINT** is ideal for Commercial Car use, as its unique construction places the largest per cent of its metal where strain is greatest. Its **great strength,** combined with its **large flat bearing surfaces,** having **perfect lubrication,** unquestionably places the "**FEENY**" in a class by itself.

Let us figure with you.

FEENY-HURD CO.
MUNCIE IND.

SIXTY-TWO different manufacturers are now specifying LONG cooling systems.

We have been able to furnish them with exactly the system they wanted and needed.

Our modern factory with its efficient crimping, punching, bending and stamping machinery makes our product **uniformly good.**

We make all kinds of cooling systems — cellular, honeycomb, spiral tube types, for all kinds of cars, trucks and tractors.

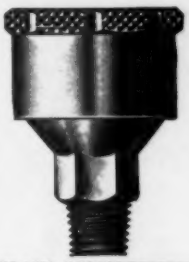
Also hoods, radiators and accessory fittings.

We guarantee to solve your cooling problems.

Let our Engineering Department help you.

Long Manufacturing Co.
Detroit Michigan

LONG



PLAIN COMPRESSION
(Patented)

Empress

BRASS AND STEEL

GREASE AND OIL CUPS

WE MANUFACTURE

a full line of Plain, Leather Packed, Ratchet, Marine, Spring Compression, and many other styles of Grease Cups.

Our line of Oil Cups is equally satisfactory and complete.

SPRING LOCK
(Patented)

Catalogue on Application

Bowen Manufacturing Co.
AUBURN, N. Y.

It's a Whole lot More Important

That You Have Good BEARINGS in Your Car Than That You Have a Good Self-Starter, or ANY Self-Starter

The better-car manufacturers see to it FIRST that you get good BEARINGS. Then they ALSO see to it that you get a good self-starter and OTHER good and up-to-date equipment.

But a few car manufacturers give you the sort of bearings that cost them the least money, and attempt to sell you their car on the strength of some good self-starter, because they have an idea that this good self-starter is going to make you think that the CAR ITSELF must, therefore, be good.

The self-starter isn't going to keep your car out of the repair shop, nor is the lighting system, nor is the speedometer, nor is the top, nor is the twelve-inch upholstering, nor any of the other necessary but decidedly MINOR features which they attempt to blind you with.

If you want your car ON THE ROAD, if you want it to cost you little to RUN, go deeper than the mere starting of it. Go right down to the vitals—the BEARINGS—the little parts that take the WEAR and therefore determine the LIFE of the car.

The manufacturers of the better cars in the low price field, as well as those in the medium and high price fields, give you bearings and bushings of—

HIGH SPEED
NON-GRAN
BEARING BRONZE

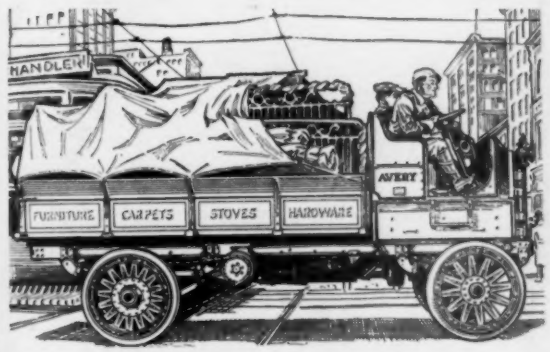
AND THEY TELL YOU SO

Manufacturers who skimp on these little bearing parts (which are way inside the mechanism of the car and which you can't see) say NOTHING about their bearings, and draw your attention right up to the self-starter and the beautiful lamps.

To REPLACE a worn bearing (and a worn bearing MUST be replaced) will cost you anywhere from $25 to $200, depending upon how much labor is necessary in tearing down to REACH the bearing.

It's better to pin your man down BEFORE you buy, and judge of a car by its VITALS rather than by its ACCESSORIES—important as these accessories may be.

AMERICAN BRONZE COMPANY
140-180 Chester Boulevard BERWYN, PENNA.
See NON-GRAN Exhibit, Chicago Show, Booth 90



You Can Use an Avery Truck All the Time

One of the biggest features about an Avery Truck is the fact that it can be used all the time, in both dull and rush seasons. By buying a truck to fit your regular season you can get out your deliveries at a minimum amount of expense in both your dull and regular seasons, and at a great saving over horses. Then when your rush season comes, all you have to do is to attach a loaded trailer behind your truck. In this way you do not have to have two trucks but can use your one Avery all the year around.

Because of this feature Avery Trucks are great money savers. With an Avery your deliveries can be made profitable the entire year.

Avery Trucks are made in all sizes from one to five tons capacity for all kinds of work. The Avery truck catalog will give you some splendid information about your hauling difficulties. Address:

THE AVERY COMPANY, 950 Iowa St., Peoria, Ill.

Pierce-Arrow

2-Ton Trucks

The only man who can buy a truck from us is the man whose business will be helped by the purchase. That is the basic feature that underlies our sales methods. We want our trucks to be in the hands of only those who can effect a saving over horse-drawn vehicles. There are enough of this class to keep us busy—and a sale to the other class would be destructive to our welfare.

We shall be glad to look into your business for you, without any obligation, and to give a frank opinion, an opinion that must be frank to serve our interests as well as yours.

THE PIERCE-ARROW MOTOR CAR CO., BUFFALO, N. Y.

COTTA TRANSMISSIONS

Internal View of Shaft-Drive Transmission, designed for use in worm-drive trucks

For Heavy Truck and Tractor Service

Eliminate Transmission Trouble

Selective type, individual clutch system. All gears always in mesh. Countershaft and mainshaft gears idle on direct. Improved speed-changing device. No plain bearings —loose gears mounted on roller bearings.

Write for Bulletin

COTTA TRANSMISSION CO.
814 So. Main Street Rockford, Illinois

PALMER

The Standardized Truck

2000-pound 3000-pound

The dealer who is looking for a truck around which he can build up a permanent and profitable business, can find the ideal truck for this purpose in the "Palmer."

This is a safe and dependable truck to sell, because of its standardized construction. Every part is made by a specialist in the making of such parts, who has reached the highest rung of success.

Every part is a tried and proved factor. There is nothing experimental about it. When you sell it you know it is going to make good, because the name it bears assures success.

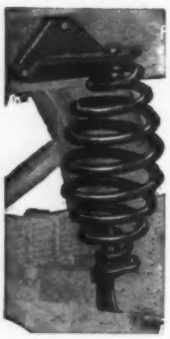
Such a truck builds a permanent business. The two models cover the requirements of 90% of all truck prospects. If you are interested, write us for full descriptions and information.

PALMER-MEYER MOTOR CAR CO.
5027-35 McKissock Avenue, St. Louis, Mo.

SAGER Shock Absorbers

Absolute Necessity for Commercial Cars

SUCCEED WHERE OTHERS FAIL



Endorsed by:

SAURER
FRANKLIN
ATTERBURY
KISSEL KAR
STEWART
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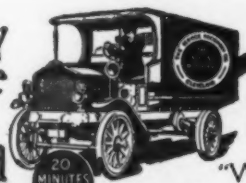
ELMORE
CRAWFORD
LOGAN
DORRIS
RAMBLER
MAXWELL
STODDARD-DAYTON
POPE-HARTFORD
AUTOCAR
COLUMBIA

Try a set at our expense

We also make bumpers to protect radiator and other vital parts at front of truck.

J. H. SAGER COMPANY
293 South Ave. - - Rochester, N. Y.

Every minute on record



Whether you operate motor trucks or horse wagons—"WASTED TIME" is costing you more money than you realize.

Eliminate this waste of time and your equipment will return you a handsome profit—Cost sheets and checking systems are good as far as they go, but they don't go far enough. The

SERVIS RECORDER

will give you accurate, impartial, mechanical supervision over your equipment at all times. It will show you clearly the time a vehicle is in use—the time spent on the road—the time spent in loading and unloading—It will demonstrate whether the cost is out of proportion to the work performed—whether you need more or fewer vehicles—which is best adapted for your needs, motor trucks or horse vehicles.

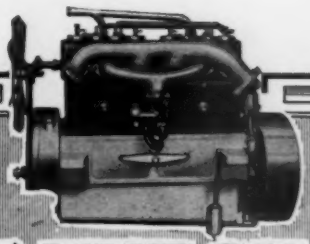
The Servis Recorder has no gears or outside connections —it is tamper-proof and works equally well on all vehicles— It will expose instantly any unlicensed use of a vehicle. Without cost to you we would like to demonstrate on your own vehicles how the Servis Recorder will save you money.

The Service Recorder Co.
2432 E. 105th St., Cleveland, O.
Branches in Twenty-Two Cities

Ford
THE UNIVERSAL CAR

For the new year—and every day of it—the Ford is the car to boost your business and broaden your pleasure. It's the car for all occasions—all year 'round. Start the new year right. Buy an economical Ford.

Five hundred dollars is the new price of the Ford runabout; the touring car is five fifty; the town car seven fifty — f. o. b. Detroit, complete with equipment. Get catalog and particulars from Ford Motor Company, Detroit.



WAUKESHA
4¼×6¼ LONG STROKE TRUCK MOTOR

WHEN you equip your truck with the Waukesha Long-Stroke Truck Motor you take the right step toward making your guarantee of efficiency good.

The Waukesha is not an all-purpose motor. It is built to give maximum efficiency in trucks only. It is not a result of the demand for truck motors—but the result of years of study in truck motor requirements. Built to give absolutely sure efficiency under the very heaviest of truck service, it successfully overcomes all the obstacles in the way of truck efficiency under average, everyday working conditions.

The Waukesha crankshaft has a tensile strength of 70 tons to the square inch—the bearings have 3 times the wearing qualities of ordinary bearings. You don't absolutely need all this strength—but it's there in case of emergencies.

Learn why the Waukesha is efficient and durable. We'll appreciate your request for information.

WAUKESHA MOTOR CO
WAUKESHA Dept. A. WISCONSIN

AN EXCEPTIONAL MOTOR

"Reliable Springs are More important on Commercial Cars than on Pleasure Cars."

THE PERFECTION SPRING CO.
Cleveland - - - - - - Ohio

COVERT
THE PROVEN TRANSMISSION

14 Years of Satisfaction

Years of unequaled service to users of Covert Transmissions has proven the superiority of Covert construction.

Designed right—built right—by men who know.

Made in sizes suitable for commercial vehicles from 500 lbs. to 10,000 lbs. capacity.

Covert Motor Vehicle Co.

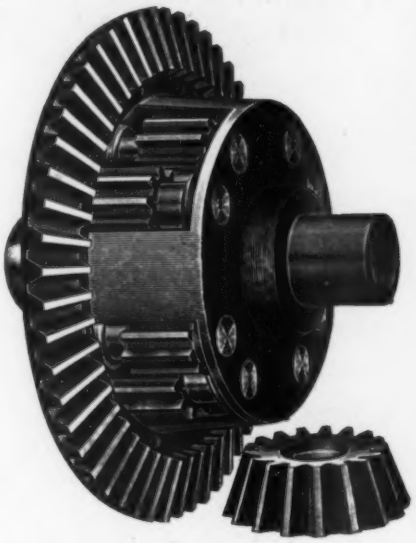
SALES OFFICE
Detroit, Mich.

FACTORY
Lockport, N. Y.

CULLMAN SPROCKETS and Differentials

in stock and to order.

Send for catalog and let us quote you on your requirements.



CULLMAN WHEEL COMPANY, CHICAGO
1351 GREENWOOD TERRACE

Brass and Nickel-Plated Pyrene Fire Extinguishers are the only one-quart fire extinguishers included in the lists of approved Fire Appliances issued by the National Board of Fire Underwriters.

Size 14 inches long, 3 inches in diameter, Weight 5 lbs. (filled ready for use).

SAVED–DOLLARS–SAVED

In Automobile Fire Insurance Premiums IF YOU ARE AWAKE

You will take advantage of the fact that if you equip your automobile with a Pyrene Fire Extinguisher—

You Can Save Money

¶ The reduction in rate calls for an Extinguisher — "one-quart, pump-type, approved by the National Board of Fire Underwriters" or "a device approved for this purpose by the Underwriters' Laboratories."

¶ Pyrene nickel-plated and brass extinguishers are the only types that qualify for this reduction.

Two facts will make the Pyrene Fire Extinguisher a standard part of motor car equipment:

1st. **The 15% Reduction in Fire Premiums.**
2nd. **The fact that Pyrene is the most efficient Extinguisher known to science, and the only practical extinguisher of the peculiar fires that occur in automobiles.**

The Ætna Accident and Liability Company and the Automobile Insurance Company of Hartford, Conn., allow this reduction—See their agents.

PYRENE MANUFACTURING CO., 1358 Broadway, N. Y.

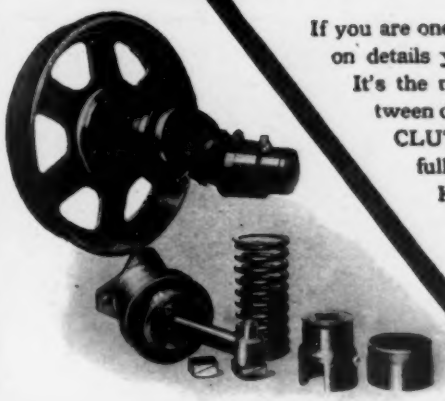
Alton	Chicago	Duluth	New Orleans	Richmond
Atlanta	Cincinnati	Honolulu	Norfolk	St. Louis
Baltimore	Cleveland	Jacksonville	Oklahoma City	St. Paul
Boston	Dayton	Louisville	Philadelphia	Salt Lake City
Bridgeport	Denver	Memphis	Phoenix	San Antonio
Buffalo	Detroit	Milwaukee	Pittsburgh	York, Neb.

Pyrene TRADE MARK
FIRE EXTINGUISHERS

PACIFIC COAST DISTRIBUTORS: GORHAM FIRE APPARATUS CO., San Francisco, Los Angeles, Seattle
Distributors for Great Britain and the Continent: The Pyrene Co., 29A Charing Cross Road, London, W. C.

KONIGSLOW CLEVELAND

can solve your clutch problem



If you are one of those concerns who are rather keen on details you know that the CLUTCH talks. It's the most frequent point of contact between driver and car. KONIGSLOW'S CLUTCHES will speak as forcefully for you as they do for KONIGSLOW

Don't wait till you are ready to place orders—write today to

KONIGSLOW CLEVELAND

For
Clutches
Clutch Rocker Shafts
Control Levers
Universal Joints

The Otto Konigslow Mfg. Co.,
Cleveland

Detroit Office
J. H. GOULD
1202 Majestic Bldg.

A Popular Size—A Popular Price—And A Krebs

MODEL E—HALF-TON—
KREBS, $1,100

Krebs quality, reliability and low maintenance costs are features with which every prospective purchaser of a motor truck should be familiar. Write us today for full information about this popular model.

Model E, ½ Ton Krebs

Loading Platform 44 in. x 68 in. back of seat.

Price of chassis, $1,000.

Price with body shown, $1,100.
Same body including screens, $1,150.
Without top, $1,050.
With closed panel body, $1,200.

We can place a few more dealers in good territory.

THE KREBS COMMERCIAL CAR CO., CLYDE, OHIO

Dependable Truck Frames of Pressed Steel

We were the *pioneers* in the manufacture of Pressed Steel Frames and are today the *largest makers*.

Because of our knowledge, skill, experience and facilities for frame production, our product enjoys an enviable reputation for quality, durability and all 'round supremacy.

Responsible truck makers desiring the best frames obtainable are invited to communicate with us regarding their 1914 requirements.

A. O. Smith Co.
Milwaukee

FRAMES

For Pleasure Cars
Commercial Cars
Trucks

1/2 ton to
10 ton

Prestige

"A man is known by the company he keeps."

In the same way the car which rides on a frame built by the

Hydraulic Pressed Steel Company

gains, in the buyer's eyes, the firmly established reputation for quality and leadership that goes with the **"Hydraulic"** name. **Hydraulic Frames** are silent guarantees of quality.

The Hydraulic Pressed Steel Co.

3152 East 61st St.
Cleveland, Ohio

LAVIGNE
Steering Gears

Equip your product with dependable Steering Gears. Get the best — Lavigne

THESE are the standard for Commercial Cars, Trucks, Tractors and High-Grade Pleasure Cars. Their quality is so high and their service records so good that we make more steering gears for Commercial Cars than any other manufacturer.

They are made in every size to meet every requirement and are furnished with drag links.

We specialize in heavy gears for motor fire apparatus.

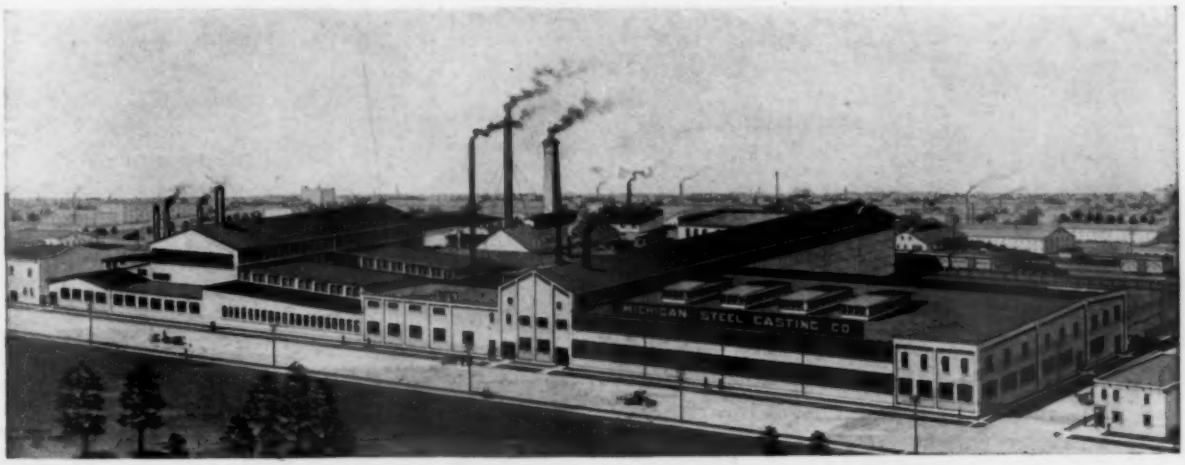
Our prices are right and we make prompt shipments.

WRITE FOR BLUE PRINTS

THE LAVIGNE GEAR CO.
Station A RACINE, WIS.

Michigan Steel Casting Co.

FOR CASTINGS OF GREATEST STRENGTH
AND SMOOTHEST FINISH



Detroit, Michigan

When Writing, Please Say—"Saw Your Ad. in the C.C.J."

POLACK TYRES

INSURE TRUCK SERVICE

Ask Polack Users

P.O.N.
The Beer that Builds

CHRISTIAN FEIGENSPAN
A CORPORATION
BREWERS AND BOTTLERS OF
LAGER BEER, ALES AND PORTER

Newark, New Jersey, U.S.A. July 12, 1913

The Polack Tyre & Rubber Co.,
246 West 59th St., N. Y. C.

Gentlemen:

Answering yours of July 9th as to 36 x 6¼" Polack Tyre which you replaced on July 8th, beg to state that according to our records this tire started June 11, 1911, on 6-ton Knox truck. It was taken off July 8, 1913, after having run 16,590 miles.

Yours truly,
CHRISTIAN FEIGENSPAN,
A Corporation,
By J. L. Black

JLB/JAB

Satisfactory truck service depends on satisfactory tyre service. Far-sighted Truck Manufacturers therefore fit POLACK Tyres as an absolute insurance of service to their Customers.

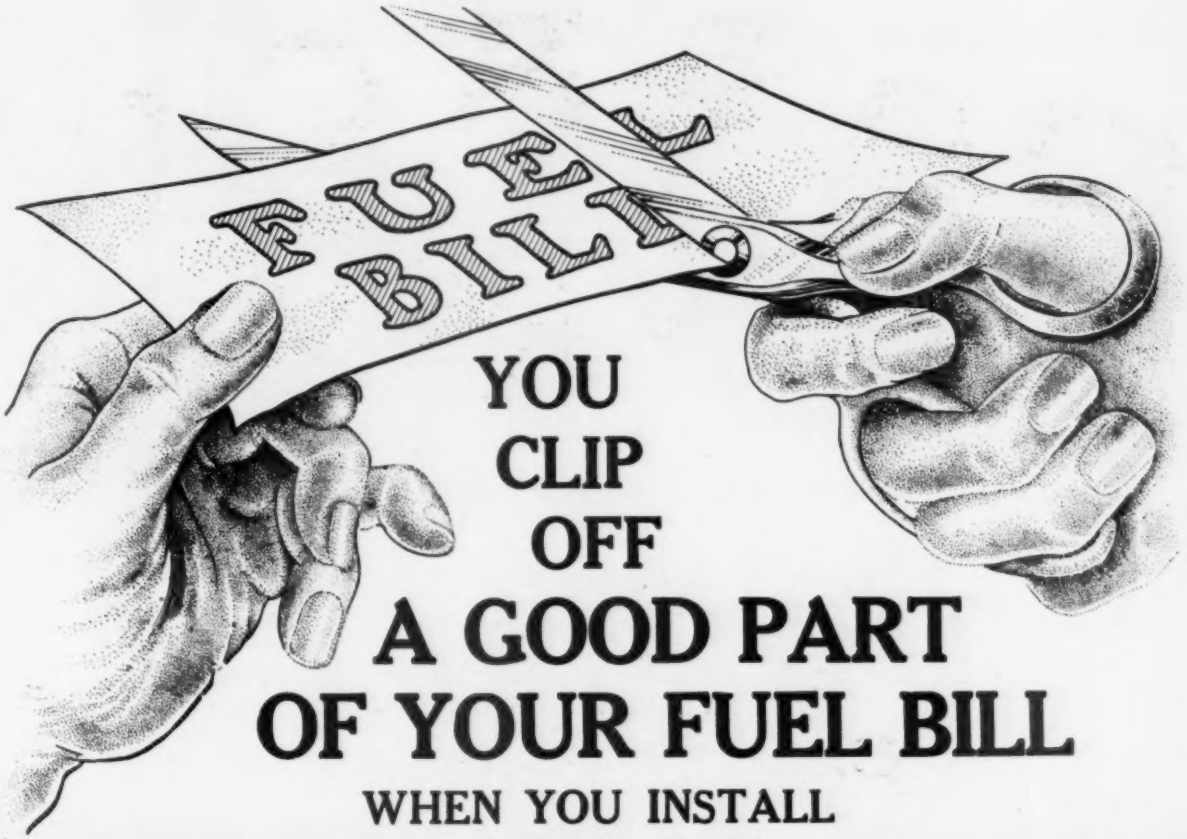
Our guarantee of 10,000 miles is invariably exceeded. Each mile more resilient at less cost per mile.

POLACK TYRE & RUBBER CO.

NEW YORK

Factory, Bridgeport, Conn.
Boston. 146 Summer Street
Philadelphia, 1803 Market Street
Chicago, 1344 Michigan Avenue
Detroit, Goldberg Building
St. Louis, 1830 Locust Street
Pittsburgh, First Ave. & West St.
Washington and Baltimore

When Writing, Please Say—"Saw Your Ad. in the C C J"



YOU CLIP OFF A GOOD PART OF YOUR FUEL BILL

WHEN YOU INSTALL

A BOWSER SAFE OIL-STORAGE SYSTEM

With the constantly advancing price of gasolene, it is mighty important that you get the use of **all** the gasolene you buy—in other words, why not turn **all** the gasolene you buy into mileage?

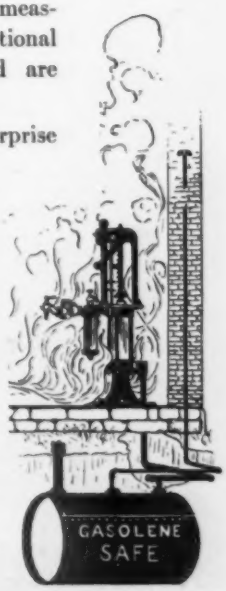
You can't do it using an above-ground storage tank or barrel. Evaporation continually takes place, changes in the temperature causing a great loss of vapor or gas. Supplying your car by hand causes yet more. You are constantly losing money because of the waste of gasolene which never had a chance to be turned into power.

Why continue these wasteful methods when the right way to correct them is at hand? The installation of a Bowser Safe Oil-Storage System will not only give you increased safety, but will materially reduce your fuel bills.

What a refrigerator is to the home a Bowser System is to your garage. And they are made to conform to that measure of safety prescribed by the National Board of Fire Underwriters and are labeled accordingly.

Treat yourself to a pleasant surprise by getting a BOWSER for your gasolene and lubricating oils. *Price*, *size* and *style* to exactly meet your needs.

Our booklet is worth reading —sent on request.



S. F. BOWSER & CO., Inc.

Home Plant and General Offices

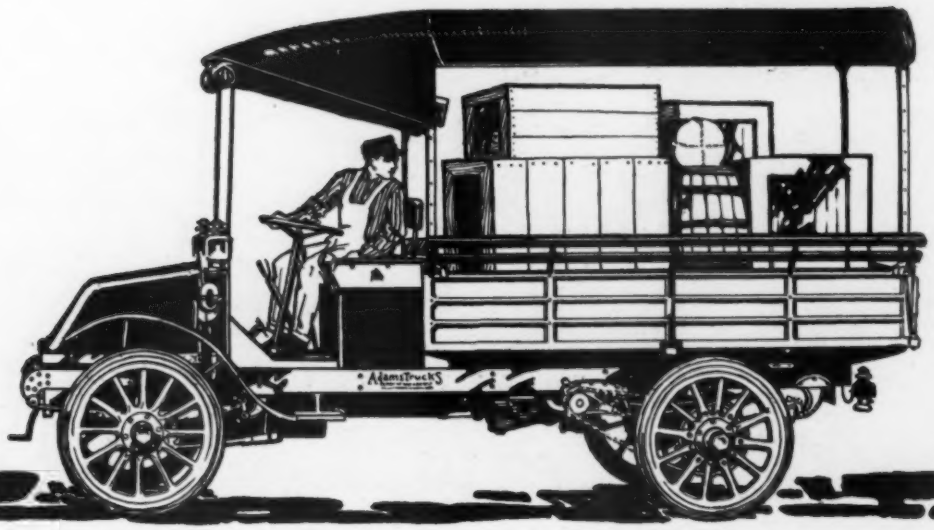
Box 2118, Fort Wayne, Indiana

SALES OFFICES IN ALL CENTERS AND REPRESENTATIVES EVERYWHERE

Original Patentees and Manufacturers of standard self-measuring hand and power-driven pumps, large and small tanks, gasolene and oil-storage and distributing systems, self-registering pipe-line measures, oil-filtering and circulating systems, dry-cleaners' systems, etc.

ESTABLISHED 1885

When Writing, Please Say—"Saw Your Ad. in the C C J"



THE ADAMS

One Ton—Chassis—

$1850

Also built in 1½ and 2 ton capacities

Coincident with this notable price reduction, made possible by greatly increased manufacturing operations, two important changes in the construction of the Adams line are announced:

Adams Trucks—all models—are now fitted with Continental Motors.

Timken Axles and Bearings are used throughout.

Adams staunchness, simplicity and complete reliability have long been recognized.

By the addition of the thoroughly standardized high-grade features named above, and other minor improvements, Adams Trucks show an excess in value which will instantly be recognized both by dealer and owner.

Dealer contracts for 1914 are now being made, and we will consider applications where we are not now represented. Write or wire at once.

The Adams Bros. Co. 438 West Main Cross FINDLAY, OHIO

First American Truck Manufacturers to use the French type of hood; with radiator at rear of motor

Bodies made in all styles, to suit any industry

Electric Trucks Are Increasing

In New York in one year the number of Electric Vehicles in use increased 45%. In Boston in the last two years the gain was 134%. In Chicago during the same period the increase is estimated at 400%.

In New Jersey in one year, one electric light company gained 67% in its revenue from charging Electric Vehicle batteries. In St. Louis during the first six months of 1912 one company showed a gain from the same source of 137%.

These figures are typical of the increasing use of Electric Vehicles throughout the United States. Here is indisputable proof that more and more forward-looking business men recognize the reliability, dependability and economy of Electric Commercial Vehicles for city haulage.

You really should investigate Electric Vehicles now.

Send For This Book Today

"The Story of the Electric Truck"

A most interesting representation of the facts and figures that you want to know about the Electric Truck. This beautifully printed book of 36 pages—yours on request. Cost of operation, etc.—actual photographs of the newest model Electric Trucks. Send for it today. Kindly ask for Booklet N.

ELECTRIC VEHICLE ASSOCIATION OF AMERICA

Boston 124 W. 42d St., New York Chicago

78-b

THE SPLITDORF ELECTRICAL COMPANY faces the ignition problems of the future with the confidence of a rejuvenated giant girded to accomplish the most herculean tasks—

with stronger frame as represented by vastly improved manufacturing methods and greatly augmented manufacturing facilities—

with a keener head and riper knowledge—thanks to accumulating years of hard practical experience—

with sinews and muscles of greater suppleness and strength owing to the enjoyment of unlimited financial resources—

with more far-reaching arms as indicated by the ever-increasing number of branch houses and distributing centers—

with a heart more insistent than ever to render real service to the consumer at thoroughly equipped service stations—

with a mind bent upon supplying ignition units of magnetos, plugs, transformers, coils, lighting and starting outfits, etc., better in design, in material, in manufacture and in everyday usage than the best—

and with a perfectly healthy system that is the real foundation of the success of SPLITDORF controlling interests—an organization drilled and trained and geared like a wonderful piece of machinery—

a vital, breathing, insistent force, irresistible in its confidence, strength, intensity and loyalty.

A full line of ***SPLITDORF*** *up-to-the-minute magnetos, transformers, plugs, electric lighting and starting outfits, etc., on exhibition at* ***Chicago Show,*** *Coliseum and Armory. Spaces 56 and 73*

SPLITDORF ELECTRICAL COMPANY

Factory: NEWARK, NEW JERSEY

Builders of 92% of American Motor Trucks

Will Use This Tire

on their 1914 output as standard or optional equipment. The almost unanimous endorsement of

GOODRICH WIRELESS TRUCK TIRES

is presented in concrete form in the second volume of "Motor Trucks of America." The success of the first volume of this handbook has led us to adopt it as an annual feature because it fills a constantly growing demand for an authentic book of reference for comparing the motor trucks manufactured in the United States.

Illustrations and specifications for insertion in Volume II of this handbook were furnished us by the manufacturers of practically ninety-two per cent of the motor trucks built in the United States.

Truck salesmen who were fortunate enough to secure a copy of Volume I called it the most helpful piece of selling literature ever published. They will be the first to send for Volume II.

If you failed to get a copy of the first volume, don't let the present opportunity escape you. The edition is limited. Requests will be filled in the order in which they are received. Fill out the coupon at once and send to us marked for the Truck Tire Department.

THE B. F. GOODRICH COMPANY

Factories AKRON, OHIO **Branches in all large cities**

MOTOR TRUCKS of America

Volume II—1914

The B. F. GOODRICH CO.
AKRON, O. Dept C.

You may send me a copy of the 1914 edition of Motor Trucks of America.

Name.....

Address.....

Firm Name.....

In What Position.....

"BOWER SAVES POWER"

"Old Reliable"

The One Truck that is Worthy of its Name

G. H. HOLLANDSWORTH, President
B. P. DUNLAP Vice-President
H. C. HOLLANDSWORTH, Sec'y & Treas.

TELEPHONES:
FACTORY, DOUGLAS 2113
CITY OFFICE, FRANKLIN 1264

MANUFACTURED BY

"OLD RELIABLE" MOTOR TRUCK CO.

City Office: 1214 Chamber of Commerce Bldg.
Factory: 3921 South Michigan Avenue
CHICAGO

Nov. 15th, 1913.

Bower Roller Bearing Company,
Detroit, Michigan.

Gentlemen:-

In reply to your letter of November 17th will say that we have no objection whatever to your using the enclosed photograph in your advertising, and we have no hesitancy in recommending your concern, also your bearings -- and you may so quote us if it will be of advantage to you.

The people who own the truck shown in this photograph are operating three of our trucks and have been very successful with same.

Thanking you for past courtesies extended, we remain.

Yours very truly,

"OLD RELIABLE" MOTOR TRUCK COMPANY.

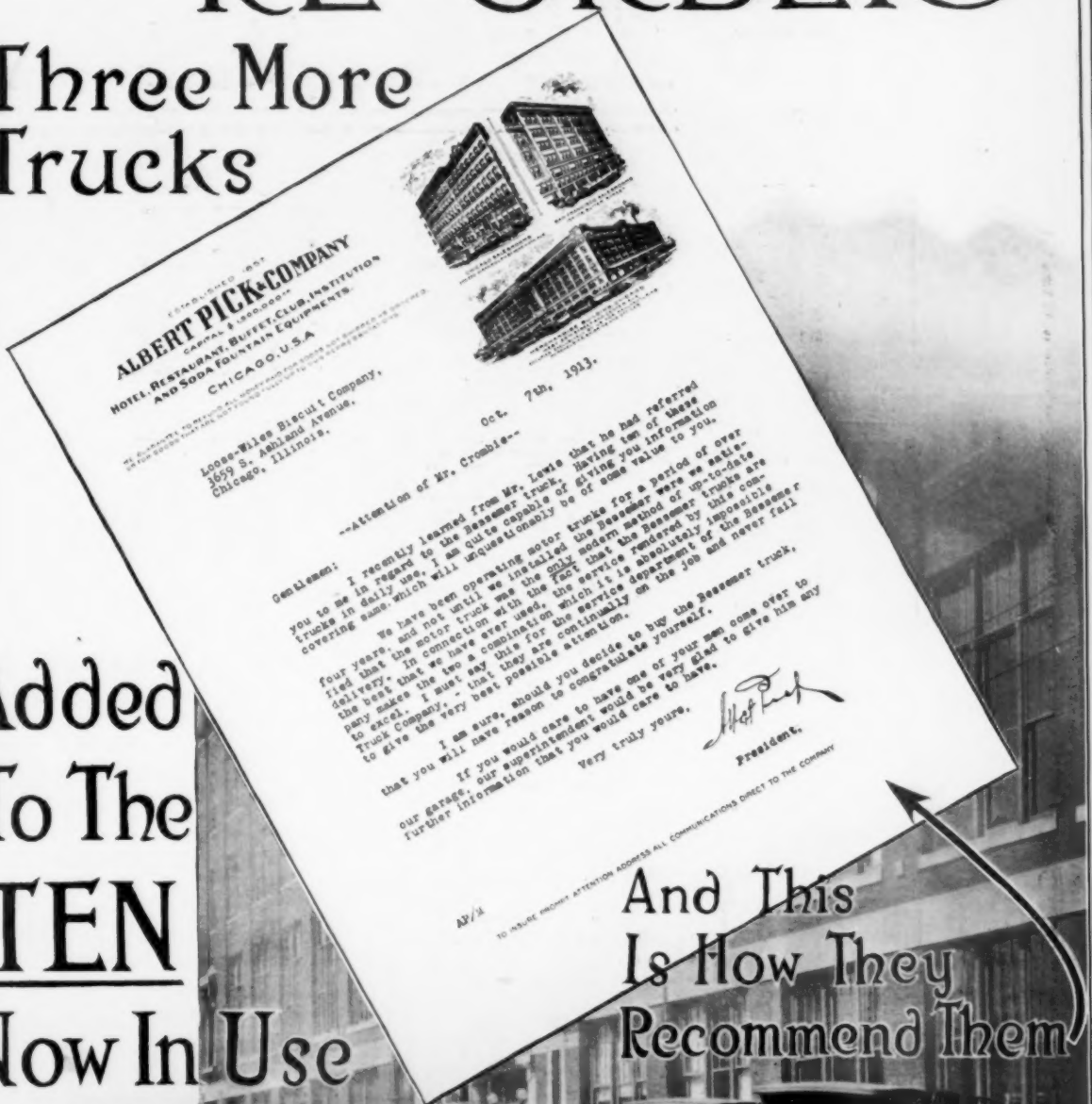
Per B. P. Dunlap
Vice-President.

BPD-EB

BOWER ROLLER BEARING CO., DETROIT MICHIGAN

A BESSEMER RE-ORDER

Three More Trucks



ESTABLISHED 1871
ALBERT PICK & COMPANY
CAPITAL $ 1000000
HOTEL, RESTAURANT, BUFFET, CLUB, INSTITUTION AND SODA FOUNTAIN EQUIPMENTS
CHICAGO, U.S.A.

Loose-Wiles Biscuit Company,
1659 S. Ashland Avenue,
Chicago, Illinois.

Oct. 7th, 1913.

--Attention of Mr. Crombie--

Gentlemen:

I recently learned from Mr. Lewis that he had referred you to me in regard to the Bessemer truck, trucks in daily use, I am quite capable of giving you information covering same, which will unquestionably be of some value to you.

We have been operating motor trucks for a period of over four years, and not until we installed the Bessemer were we satisfied that the motor truck was the only modern method of up-to-date delivery. In connection with the Bessemer trucks we secured the best that we have ever used, the service rendered by this company makes the two a combination which it is absolutely impossible to excel. I must say that this for the Bessemer Truck Company, - that they are continually on the job and never fail to give the very best possible attention.

I am sure, should you decide to buy the Bessemer truck, that you will have reason to congratulate yourself.

If you would care to have one of your men come over to our garage, our superintendent would be very glad to give him any further information that you would care to have.

Very truly yours,

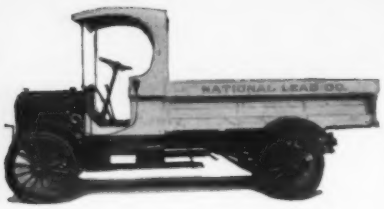
President.

AP/H

TO INSURE PROMPT ATTENTION ADDRESS ALL COMMUNICATIONS DIRECT TO THE COMPANY

Added To The TEN Now In Use

And This Is How They Recommend Them



1. Carries a heavy cargo with ease and haste.

BESS

2. Delivers an entire heating outfit in one trip.

The Truck for 3 Models

3. The Bessemer is easy to load and unload.

EVERY TRUCK

There is no longer any reason, Mr. Dealer, why you should hesitate in taking on a live Commercial Car proposition. There was a time when the proper handling of a commercial car meant considerable outlay of money, necessitated a spacious show room and required the maintenance of an expensive service department. This time has passed.

The proposition offered by the Bessemer Motor Truck Co., solves conclusively the Commercial Car problem from the Dealer's standpoint.

Here are three Trucks; one ton, one and one half to two tons, chain drive, and one and one half to two tons, worm drive, all made under one roof. Instead of handling the products of two or three makers to cover the tonnage requirements, you are able to meet practically every demand with the products of one factory.

This condition means not only the simplifying of your sales plan, but direct Factory co-operation. The high efficiency of the Bessemer line guarantees the satisfaction of your customer.

4. Refined body lines, a prominent Bessemer feature.

5. A Bessemer with side stays to carry bulk.

6. Sectional loading is at times a great convenince.

7. The Hotel Reanor finds their Bessemer invaluable.

EMER

the DEALER Cover

REQUIREMENT

A glance at the various Bessemer Trucks surrounding this advertisement will give you a comprehensive idea, not only of its widespread endorsement, but of the great diversity of uses to which the line is so splendidly adapted. There is a model for practically every need and every one is loaded with a cargo of guaranteed satisfaction. Wherever the Bessemer Truck is introduced, it makes good. One repeatedly sells another. Today there are numerous concerns using a score or more of Bessemer Trucks simply because the first made good, the second likewise, and so on.

Merchants everywhere are awake to the great possibilities of commercial delivery. The field is practically unlimited. The seed has scarcely been sown, but now, Mr. Dealer, is the time to prepare for the harvest which is fast approaching. Pick the line that you know is right. Communicate at once for further particulars and be well on your way when others are scrambling to overcome the handicap of lost time.

14. Passed the 100 per cent efficiency test of the U. S. Government.

13. The platform body has proven a great convenience.

12. For the sure and prompt delivery of perishable goods.

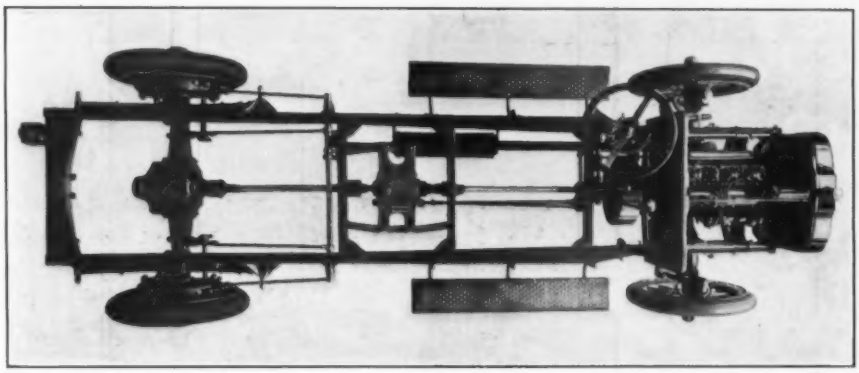
11. Conspicuous for its neat, refined appearance.

8. Just the thing for the delivery of groceries, etc.

9. Lightens the expressman's burdens.

10. A splendid advertisement for the wide-awake business house.

BESSEMER



Worm Drive

Now that the Bessemer line includes a model driven with the powerful, noiseless worm gear, it gives the dealer a selling opportunity unequaled in the annals of the Commercial Car industry.

The many superior features of the Bessemer line are sufficient in themselves to command the most careful consideration, but now with the addition of a worm gear driven Bessemer, any dealer who is really looking for a live proposition cannot consistently overlook this opportunity.

Model	C	A	D
Capacity	1 ton	1½ to 2 ton	1½ to 2 ton
Horse Power	25	30	30
Wheel Base	108	120 or 136	136
Tread	56	56	56
Tires Front	34 x 3	34 x 3½	36 x 4
Tires Rear	34 x 3½	34 x 5	36 x 5, 36 x 3 dual
Frame Pressed Steel	4⅝ x 2 x 5/32	4⅝ x 2 x ¼	4⅞ x 2 x 5/16
Front Axle	2 x 1⅝	Timken	Timken
Rear Axle	2½ x 1¾	3″ x 1¾ Timken	Timken Worm
Springs	Semi-Elliptic	Platform	Semi-Elliptic
Carburetor	Rayfield	Rayfield	Rayfield
Cooling	Thermo-Syphon and Fan	Thermo-Syphon and Fan	Thermo-Syphon and Fan
Ignition	Eisemann	Eisemann	Eisemann
Control	Center	Center	Center
Clutch	Cone	Cone	Cone
Transmission	Selective 3 Speeds Forward and 1 Reverse	Selective 3 Speeds Forward and 1 Reverse	Selective 3 Speeds Forward and 1 Reverse
Drive	Side Chain	Side Chain	Worm
Brakes	Rear Wheel Internal and External	Rear Wheel Internal and External	Rear Wheel Internal and External
Steering Gear	Worm and Sector	Worm and Sector	Worm and Sector
Price, Chassis	**$1250.00**	**$1800.00**	**$2300.00**

BESSEMER MOTOR TRUCK COMPANY

Grove City, Pa.

Boston, Mass. - - - BRANCHES - - - Pittsburgh, Pa.

A. C. VANDERPOEL, 18 Broadway, New York City, Export Representative

Flint

DEALERS LOOK!!

Model "C"
1600 to 2000 lbs. Capacity
DOUBLE REDUCTION
(7 to 1) REAR AXLE

New 1914 Prices

CHASSIS
34" x 3" Front
34" x 3½" Rear
Solid Tires $1285.00
34" x 4½" Front
35" x 5" Rear
Pneumatic Tires $1370.00

COMPLETE CAR, Painted and Trimmed, with Body,
$80.00 to $175.00 additional, according to type of body

Flint Motor Wagon Department

DURANT-DORT CARRIAGE CO.
FLINT, MICHIGAN

"J." What Is Your Proposition to Dealers?

Flint

When Writing, Please Say—"Saw Your Ad. in the C C J"

Lower Prices for Motor Trucks

General Motors Truck Company Announces New Policy

Beginning the New Year, we will make a reduction in price of both Gasoline and Electric Trucks, that will astonish every man who has looked into the Motor Truck proposition.

Don't form a hasty conclusion. We are **not** "closing out" a lot of out-of-date models.

We are in the Truck business to stay, but we are starting the New Year with a new policy involving **big volume and the elimination of unsound trade practices.**

Our past experience—and we were pioneers in the industry—has proved to us that the Truck business has been conducted on a wrong basis—by ourselves as well as by others.

GMC TRUCKS

Our New Policy Means:

No long-time sales, no "trading-in" of second-hand trucks; no "free" service with unlimited maintenance—practices which have placed a premium on careless or reckless operating and are responsible for the present excessive prices on motor trucks.

By eliminating these evils we have done away with an enormous overhead expense and big losses; and by improved factory facilities and increased production, we are able to make a substantial reduction in prices.

For instance: a truck that we formerly sold at $4500 will now sell at $3000, one that was $3250 will now be $2250.

Our guarantee of quality and promise to furnish free any part that may prove defective, remains the same as always.

Our trucks are no longer in the experimental class; when they go into service they go to stay and to make money for their owners.

Why shouldn't they be sold on a business basis as other merchandise is sold?

GMC Trucks are in active service in almost every line of business in nearly every important trade center.

We were the first makers of both gas and electric trucks and the only manufacturers, therefore, able to give you unprejudiced advice as to the kind best suited to your particular business.

We can help you make the New Year prosperous
Complete information on request

GENERAL MOTORS TRUCK COMPANY
PONTIAC MICHIGAN

One of the Units of the General Motors Company, the Largest Builders of Motor Vehicles in the World

Branches:— New York Boston Philadelphia Detroit Chicago Kansas City St. Louis

Silent **Lippard-Stewart** Powerful

Trucks That Meet the Demand

"How am I to know why this truck or that is better than another?"

Not long ago this question was a common one, but at that time motor transportation was new and trucks of a diversity of types were untried. Then the purchase of commercial cars was largely a matter of confidence. But times have changed. Owners have been watching truck development. They have found out what amount of work a car can reasonably be expected to do under certain conditions. And, what is more, they now make it their business to know the relation of the type of truck, capacity and mechanism considered, to the service expected of it. In other words, *they know what they want.*

Capacity 1½ Tons

Operated by
Dauler, Close & Johns, Pittsburgh

Modern Worm Drive

In a Lippard-Stewart truck, this public demand is given the credit it deserves, because its designers have their ears to the ground—quick to heed the trend of the times. For instance, the shortcomings of chain drive, the uncertainty and annoyance which it involved, its excessive wear and waste of power, opened the eyes of users to the advantages of the worm and gear, the success of which has long since been proved in the hardest service—London omnibuses for example. Now, in the Lippard-Stewart, the solution of former drawbacks is offered to American users in a rear axle of the highest quality—Timken-David Brown Worm-Drive.

One of three owned by Pacific Hardware and Steel Co., San Francisco.

Capacity 1500 lbs.

Things Proved by Service

Then again, years of experience have demonstrated that no longer can a touring car answer for a truck. Commercial vehicles require simplicity, reserve power and much greater strength. Truck users want the smoothness, pulling power, and the low gasolene consumption of the long-stroke motor, common-sense automatic speed regulation, security and efficiency of the radiator, the choice of solid or pneumatic tires to suit conditions, the utmost safety—and in each essential the Lippard-Stewart measures up to the standard.

And so we might enumerate instance after instance. But the one point that investigation of Lippard-Stewart trucks makes evident is this: every separate part, every complete unit, every principle of design embodied in their make-up carries with it the stamp of modern practice—the approval created by the highest type of service and voiced by popular demand.

Lippard Stewart trucks are furnished in two capacities: 1½-ton chassis, worm-drive, $2300; 1500 lb. chassis, bevel-drive (pneumatic tires), $1650, worm-drive (solid tires), $100 extra. Bodies for various purposes.

LIPPARD-STEWART MOTOR CAR CO.
1733 ELMWOOD AVENUE, BUFFALO, N. Y.

Guaranteed to Spin Any Motor in Any Motor Vehicle, at Any Time in Any Weather

That is the strong guarantee that is given the

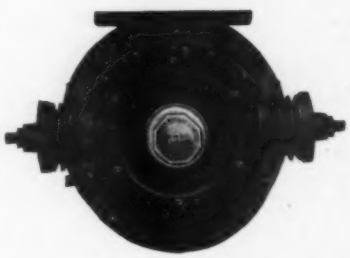
Thurber Rotary Starter

It takes confidence in a starter to give it a guarantee like that, but we have it. We know to a certainty that it will spin the largest motor under the most adverse conditions and furthermore, that it is the *only* starter which can be depended upon to do it.

The THURBER ROTARY STARTER is operated by compressed air, the universally acknowledged best means of starting and stopping heavy bodies. Even electric railway cars use compressed air when absolute certainty of action is demanded.

While the THURBER is not the only compressed air starter, it is entirely different from all others — the most simple, powerful, efficient and practical. This conclusion has been reached by leading engineers of the country after giving it severe tests.

There is nothing complicated about it, nothing to get out of order, nothing difficult to operate. It is a dependable, efficient system, characterized by strength, durability, simplicity and certainty of action.



The STARTER consists of a small rotary — (cranking device) with air pump attached, air tank, two pipes and one valve. It is operated from the seat by a foot pedal. The pump can also be used for inflating tires. It may be attached to any make of standard trucks, no special lay-out being required, and once on it does not require a service station to keep it going.

The owner who equips his truck with the THURBER will soon *save its price* in the reduced consumption of gasoline.

A running motor while the truck stops for deliveries, errands or inquiries, eats up a tremendous amount of gasoline without rendering any service. With a THURBER STARTER your driver will not have any incentive to let the motor run, as he can start the car at any time with a pressure of his foot. Drivers will let the motor run, while loading or unloading, if they have to crank it, but they will stop the motor if they can start again without any labor.

Economy of gasoline, time, labor and tires and a greater all-around efficiency will be your reward for using the THURBER ROTARY STARTER.

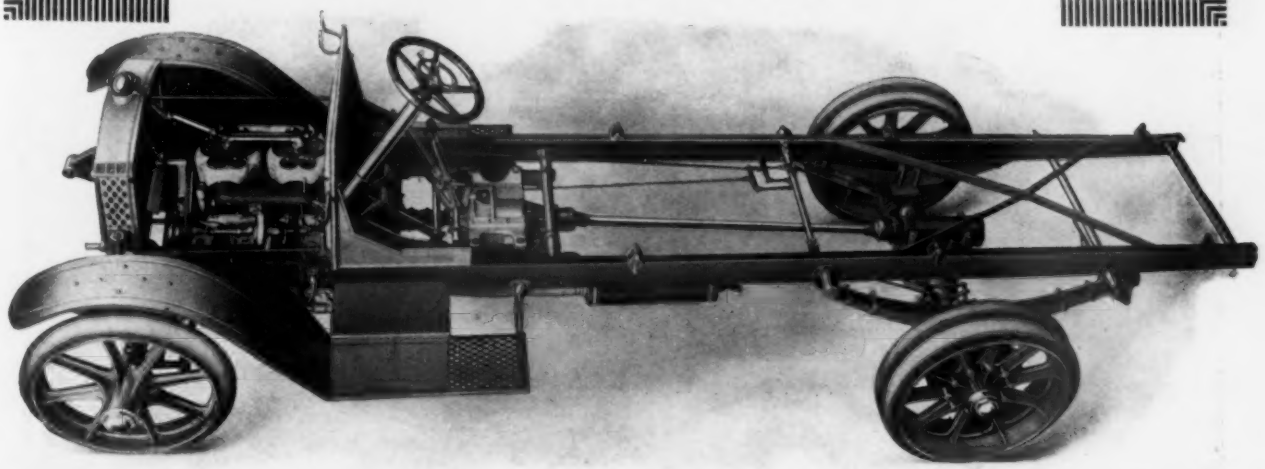
Booklet and prices on request.

THE THURBER ROTARY STARTER COMPANY

CHENE AND ATWATER STREETS, DETROIT, MICH.

CROWN

WORM-DRIVE MOTOR TRUCKS



CROWN 5000 POUND CHASSIS

ANNOUNCEMENT!

We beg to announce the 1½ ton and 2½ ton ***Crown Worm-Driven*** Commercial Cars for 1914.

Crown Trucks are the result of long experience and careful study of the best in engineering, and manufacturing practice.

Every part—every unit—every bolt, nut and screw, is a substantial case of ***"not how cheap"*** but ***"HOW GOOD."*** Crown Trucks are built for stability and efficiency, for all road conditions and all types of service—and to give unbounded ***satisfaction to their owners.***

Responsible, energetic dealers are invited to Correspond with us at once. We seek a few more selling representatives—live ones—those who recognize merit and desire to connect with a dependable, lasting and efficient selling proposition.

Crown Worm-Driven Trucks Stand Supreme

Send for complete catalog, terms and detailed information. Write today.

CROWN COMMERCIAL CAR CO.

Factories:
North Milwaukee, Wis.

Milwaukee, Wis., U. S. A.

Start Right With a G. V. Electric

Successful motor truck operation today consists in having properly applied installation and an operating policy that avoids the mistakes that have proven so disastrous to others. Every problem we have overcome adds to the worth of the experience you buy into as a G. V. purchaser. **Catalogue 84 on request**

GENERAL VEHICLE COMPANY, Inc.

General Office & Factory: Long Island City, N. Y.

New York **Chicago** **Boston** **Philadelphia**

When Writing, Please Say—"Saw Your Ad. in the C C J"

Endurance Contests that Count

CHICAGO SHOW
Space 26
COLISEUM GALLERY

THE daily pull of service, the hauling of heavy loads wherever the demands of business require, the hum-drum performance of routine duties and the occasional extraordinary ordeal of bad roads and heavy grades, these are the contests that really determine the relative efficiency of motors and of motor driven vehicles.

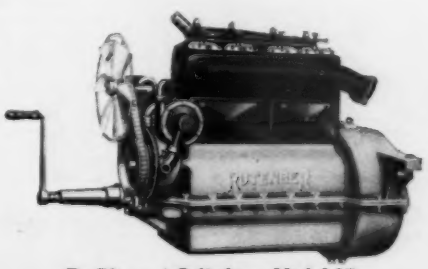
THE RUTENBER MOTOR

not only carries its cars to cup winning records on exhibition runs, but in the daily round of duty, in trucks, commercial cars and pleasure vehicles, it demonstrates its supremacy. Rutenber Fours and Sixes will be found doing ungrudgingly the work that other motors dare not attempt. And it is because the Rutenber has consistently rendered this kind of service for so many years that discriminating buyers select cars that carry the Rutenber.

The slightly higher price of the Rutenber Six, 1914 Motor, as compared with other sixes makes possible a degree of efficiency otherwise unattainable.

Write for the Rutenber Book

RUTENBER MOTOR COMPANY
MARION INDIANA



En Bloc. 4 Cylinder. Model 27.

How the Stewart Hub Odometer Cuts Motor Delivery Costs

IT costs you $7.94 to operate a three-ton truck 15 miles a day. This is 53 cents a mile.

A team of horses can travel 15 miles a day with a three-ton load and will cost, with an extra or shift horse, $7.19 a day. This is 48 cents a mile.

Your truck loses you 5 cents a mile compared with what a team can do.

But even with its necessary stops, your motor truck ought to travel 30 miles a day. It will do this at a cost of $9.27 a day—31 cents a mile.

Two teams will cover this 30 miles at $14.38 a day—again 48 cents a mile. Compared to this the motor truck makes the worth while saving of 17 cents a mile.

At 15 miles a day your truck is *losing* 5 cents a mile—75 cents a day—$225 a year—compared with horses. It might as well be *saving* 17 cents a mile—$5.10 a day—$1530 a year—by running 30 miles a day. These are big figures. They apply to *your* service.

"But," you say, "I guess my truck makes more than 15 miles a day."

How do you know?

Put on a Stewart Hub Odometer and you'll find out some startling things, just as many other truck owners have. You'll find that you are not getting the mileage you supposed by a long way. ***You'll find that it doesn't pay to run a motor truck without the Stewart Hub Odometer.*** You'll begin to demand that each driver keep his truck *on the move*—and then you will have turned the biggest trick in successful, profitable motor trucking.

The Stewart Hub Odometer tells you the truth. It is the only instrument of its kind that is mud and waterproof, simple, durable and positive. It has no springs, pawls and ratchets to go wrong. Its drive is by worm and spiral gears—sure. Its dials are controlled and turned by our never-failing Geneva Stop Principle.

Have a Stewart Hub Odometer put on each of the trucks you now operate—and on each new truck you buy. It means the difference between failure and success.

A sturdy, sightly instrument that can be fitted to the hub of any truck or electric pleasure car. It registers to 100,000 miles in tenths, and repeats. The numerals are large, clear and easy to read. Their answer is always summed up. The mechanism is fully protected.

$15 *Complete*

An interior view of the Stewart Hub Odometer. Note its simplicity and strength. This shows the solid brass dials on their special shaft, the positive drive and our own exclusive Geneva Stop Principle, which moves and locks the dials with never-failing precision.

The Stewart Speedometer Factory, 1958 Diversey Blvd. **Chicago, Illinois**

Stewart-Warner Speedometer Corporation

The world's largest manufacturers of Speedometers for automobiles, electrics, trucks, motorcycles, motor boats, aeroplanes and cream separators

When Writing, Please Say—"Saw Your Ad. in the C C J"

Single Dual

Make This Year Count

The commercial car end of the automobile industry is the one that will be the most profitable from now on and the tires that will be most in demand for these cars will be Wireless Tires.

There are ***now*** any abundance of these, but if you would start the year right, with the hope and expectation of making it the best you have ever experienced, you will do well to carry

GIBNEY WIRELESS TIRES

These are the original Wireless Tires; those which have blazed the path for the others to follow; which were a proved success while the others were only experiments; which have made good while the makers of others were deriding them, only to later scramble to imitate their construction. However, we were

THREE YEARS AHEAD

and while the others were struggling with their problems we were constantly forging ahead, and ever maintaining our three years lead.

The dealer who handles GIBNEY WIRELESS TIRES is selling the ***leader,*** the proved, successful tire, with records of achievement back of it. Our exclusive agency proposition enables him to cash in on this in a way that will make this year count big in his bank balance. If you are keen on making money, write for full particulars.

Gibney Tire & Rubber Co., Factory, Conshohocken, Pa.

Philadelphia New York Boston Minneapolis Washington Baltimore

When Writing, Please Say—"Saw Your Ad. in the C C J"

CRAMP

Gear Bronzes

The Car Manufacturer, to put his product head and shoulders above the general run of makes on the market, must have distinctive features in his car and features with reputations of the best.

The Worm-Drive has caused more discussion than any other feature introduced in the industry in the last few years. It is no longer an experiment, as its performance has shown it to be the best type of drive—less power loss, less friction and less noise.

The Car Manufacturer adopting this type of drive with CRAMP BRONZE WORM WHEEL and Steel Worm will attract attention immediately. He will be the forerunner of what will eventually be universally adopted and he will be able to connect with his product a name that is known over the entire world—

CRAMP

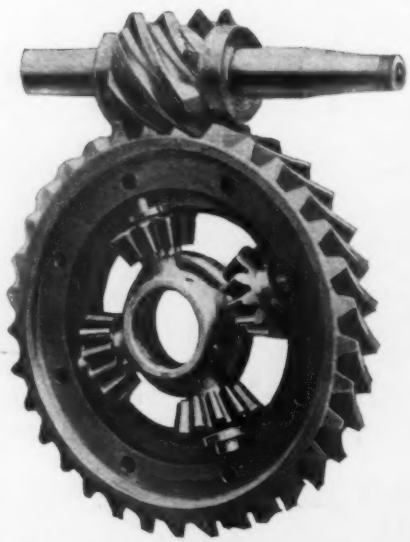
Every nation on the face of the entire globe has endorsed CRAMP METALS, and when the United States Government designed the stupendous Panama Lock Gates, requiring enormous gearing and training, it unhesitatingly specified CRAMP METALS.

We have been making WORM GEARS for over sixty years—our first gears are still in service. This WORM-GEAR knowledge, backed by a hundred years of experience in manufacturing metals, guarantees the Car Manufacturer a feature, the prestige of which alone will increase his sales and put his car in the limelight of the buying public.

Write us about it.

There is no necessity of your importing metals, it costs you money and time. The very metals you would import are those that have been discarded in foreign countries in favor of CRAMP METALS.

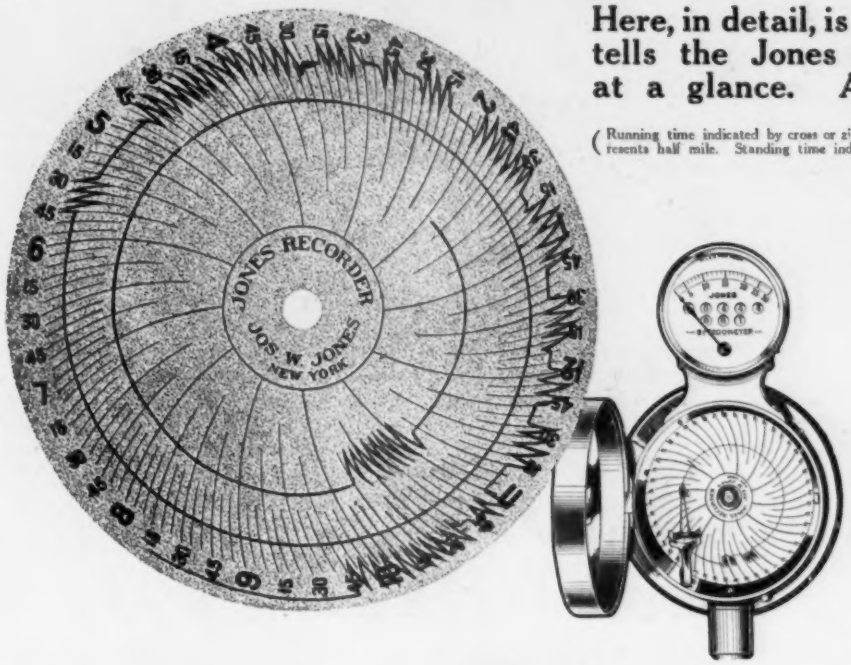
CRAMP METALS are used over the entire world.



The William Cramp & Sons Ship & Engine Building Co.

Philadelphia Pennsylvania

When Writing, Please Say—"Saw Your Ad. in the C C J"



Here, in detail, is what the chart tells the Jones Recorder user at a glance. A day's record

(Running time indicated by cross or zig-zag lines, each one of which represents half mile. Standing time indicated by continuous straight line.)

Chart put on at 8.15
Truck ran from:

9.45	to 10.37	— 10½	miles
10.45	" 11.00	— 3	"
11.15	" 11.37	— 4	"
11.45	" 12.05	— 2¾	"
12.15	" 12.35	— 4¼	"
12.47	" 1.15	— 5	"
1.20	" 2.00	— 7¼	"
2.15	" 2.35	— 3	"
2.45	" 2.55	— 2	"
3.05	" 3.22	— 3½	"
3.33	" 4.50	— 14½	"
5.30	" 5.45	— 3¼	"

12 stops

Truck out of service for 16½ hours and then ran again from 10.15 to 11.08 — 9¼ miles.

Chart removed at 2 o'clock, total run — 72¼ miles

Average speed, 11 miles per hour.

Running time 6 hours and 25 minutes.

Economical Truck Maintenance Depends Upon a Detailed and Absolutely Accurate Daily Report

SUCH a report is not possible with an Odometer which registers only mileage. You should know besides the total distance your car travels each day, the number of stops it makes, the duration of each stop, the speed at which the truck is driven at all times and whether or not your driver is making his deliveries at no waste of your time. This necessary and much desired knowledge is only obtainable through the use of the

Jones Recorder

Every move your truck makes and every stop your driver makes is recorded with minute-to-minute accuracy by means of a marking point on a chart enclosed in the sealed and locked case of the Jones Recorder.

It is impossible to alter the record in any way. It is under lock and key. The degree of personal efficiency of each one of your drivers, his capabilities, carefulness and trustworthiness, is absolutely established by means of the Jones Recorder.

And in fixing an absolutely accurate cost unit for operating expenses, there is no instrument that is mechanically as well adapted for this purpose as the Jones Recorder.

The attachment is the same as the Jones Speedometer, with the sturdy, dependable one-piece wire cable drive and heavy duty fittings at the wheel. Every Jones Recorder now bears the broad and liberal guarantee of the H. W. Johns-Manville Company.

Two Styles

Recorder alone, in solid brass case, price, $65.

Same with 30-mile Speedometer, Odometer with 100,000-mile season mileage, and trip mileage to 100 miles with instantaneous trip reset, price, $85.

H. W. JOHNS-MANVILLE CO.

Manufacturers and Marketers of Brake Lining, Spark Plugs, Electric Lamps, Speedometers, Horns, Fire Extinguishers, Dry Batteries Vaporizers, Auto Locks, Fuses, Tapes, etc.

Madison Avenue and 41st Street, New York

Akron	Boston	Cleveland	Detroit	Indianapolis	Milwaukee	Omaha	St. Louis	Syracuse
Albany	Buffalo	Columbus	Duluth	Kansas City	Minneapolis	Philadelphia	St. Paul	Toledo
Atlanta	Charlotte	Dallas	Galveston	Los Angeles	Newark, N. J.	Pittsburgh	Salt Lake City	Washington
Baltimore	Chicago	Dayton	Houghton	Louisville	New Orleans	Portland, Ore.	San Francisco	Wilkes-Barre
Birmingham	Cincinnati	Denver	Houston	Memphis	New York	Rochester	Seattle	Youngstown

(2262)

E.J. REILLYS
FIRE PROOF STORAGE WAREHOUSE
SEPARATE ROOMS FOR FURNITURE,
PIANOS, TRUNKS AND BRIC-A-BRAC.
SILVER VAULTS.
Packing, Crating and Shipping A Specialty.
51-53 MECHANIC ST. RED BANK, N.J.

CROCE
Motor Trucks

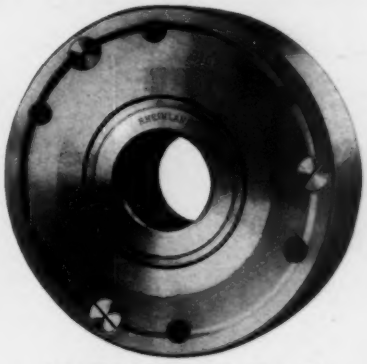
Here are a few pertinent reasons why the representative CROCE installations shown in this advertisement are affording their owners unqualified satisfaction by giving them economical, efficient, reliable service.

Original design embodying distinctive features.
Bosch High-Tension Magneto.
Wisconsin Motors of extraordinary strength.
Timken Axles on Timken Roller Bearings.
Schebler Carburetor.
Brown-Lipe Transmission on Timken Bearings.
Spicer Universal Joints.
Schwarz Wheels with Interlocking Spokes.
Croce Patent Radiator (Kells make).
Positive Fuel-Proof Oiling System.
Special Clutch Yoke and Transmission Brake.
Greater Strength with Less Weight, and other features of equally great importance.

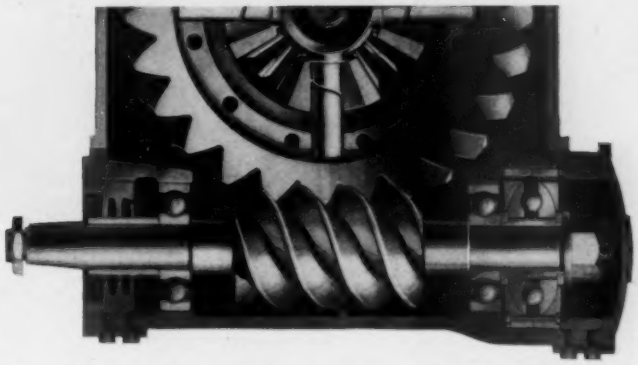
The CROCE is a great truck to own and a mighty satisfactory one to sell. It invariably makes good, creates friends, brings repeat orders and produces new business.

If the truck you handle doesn't do this or offer these advantageous features, it's time you inquired about the CROCE. ¾, 1, 2 and 3 ton trucks.

Croce Automobile Co.
Asbury Park, N. J.

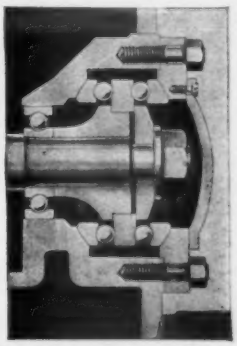


The Rhineland Double-Thrust Bearing, Self-Inclosed, compact, protected from dirt, ready to be installed in one piece and without having to machine any collars or spherical seats. Easily demounted and reassembled.



The Rhineland way. Saves the space indicated by light lines and seated by shoving into place and tightening one nut.

See what you gain by using the Rhineland Double-Thrust Bearing



The old way. Many parts, much careful and expensive machining and danger of bad seating. Bearing falls apart in removing.

Consistent provision for double thrust *demands* this Rhineland Bearing for many reasons.

First, it does with *one* row of balls what in every other ball type of thrust bearing requires *two* rows, and it goes into much less space than will any other double-thrust bearing that does equivalent work.

Reference to the above typical installation shows the space saving and the reduced overhang. Note also the saving of expense for the two spherical seats and for the spacing and locking collars which are required with a plain two-row bearing.

Handling operations are greatly reduced as the Rhineland Bearing is put in as a single piece, and does not fall apart when the cap is removed.

Further, the adjustments and the automatic and perfect compensation to shaft spring are fixed *by us*. This not only saves much labor, but makes *us* responsible for these important matters. It's better to have experts seat the aligning discs and get the backing of a firm with reputation at stake, than to take the judgment here of an erecting man or operative who may be little experienced with ball bearings.

The Rhineland Double-Thrust Bearing is made in types and sizes to assuse durability and splendid service under a wide load and speed range. It is accurate in the extreme and absolutely right as to material, workmanship and design,

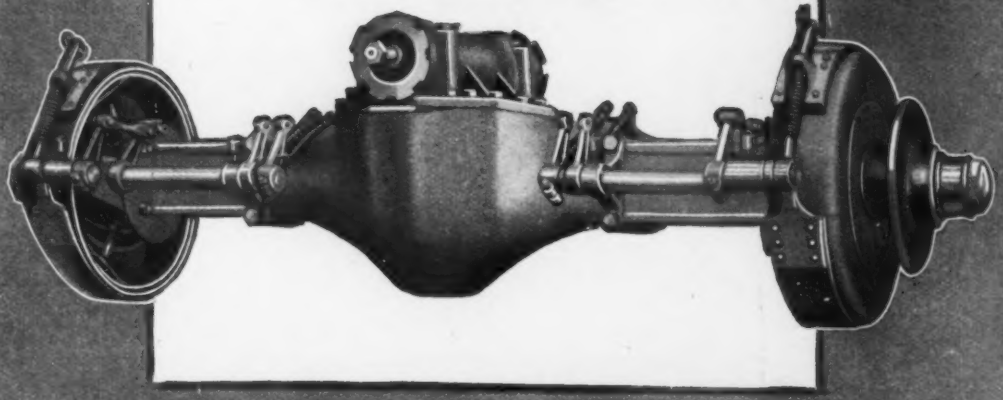
The power saving and ultimate economy obtainable are worth most careful investigation by every designer. Send your blue prints and our engineers will show you how to apply this bearing best *in your particular case.*

At least write for literature.

RHINELAND
MACHINE WORKS COMPANY

140 West 42d St., New York

OFFICES, AGENCIES AND SUPPLY DEPOTS IN PRINCIPAL MANUFACTURING CENTERS THROUGHOUT THE UNITED STATES



It will pay YOU to BUILD SILENCE into YOUR TRUCKS

You Can Do It Best— and Most Economically—With—

Sheldon Worm Gear Drive

The day is now in sight when the discriminating motor truck buyer will insist upon worm drive. He realizes that the elimination of noise means increased efficiency. He knows that the worm drive is not dependent upon delicate adjustments; and that its efficiency actually increases in service. Wear in any other form of drive causes extreme noise, does **not** have this effect upon the worm and worm wheel.

All the quality of design and workmanship that has made SHELDON SPRINGS and SHELDON AXLES famous is built into SHELDON WORM DRIVES. The worm is almost indestructible and will stand years of wear; the wheel is of phosphor-bronze. SHELDON KNOWLEDGE and SHELDON EXPERIENCE make these the best obtainable.

In addition to the silence of the truck, think of the **neatness,** the **simplicity,** the **efficiency**—that are distinct advantages of the worm drive.

Remember that **every noted European manufacturer of commercial vehicles is using worm drive.** These European manufacturers have proved that the long life, quiet running and high efficiency of the worm drive are sufficient reasons for its use on their trucks.

And if you desire still further evidence of the desirability of worm drive as an asset to greater efficiency and increased sales value of **your** trucks—write us.

SHELDON AXLE COMPANY, Wilkes-Barre, Pa.

CHICAGO OFFICE: 68 E. 12th Street

SAN FRANCISCO OFFICE: 444 Market Street

DETROIT OFFICE: 1215 Woodward Avenue

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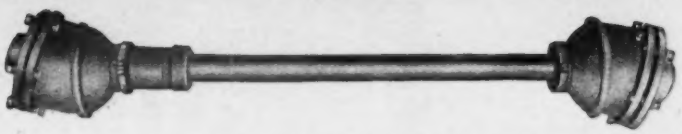


UNIVERSALLY ACCEPTED AS THE MOST DEPENDABLE FLEXIBLE CONNECTION KNOWN TO MOTOR CAR PRACTICE

OIL-TIGHT DUST-PROOF

PARTS INTERCHANGEABLE

SPICER MANUFACTURING COMPANY, PLAINFIELD, N. J.

Sales Representatives:
K. Franklin Peterson, 122 S. Michigan Blvd., Chicago; L. D. Bolton, 2215 Dime Savings Bank Bldg., Detroit; Thomas J. Wetzel, 17 W. 42d St., New York
Foreign: Benjamin Whittaker, 21 State Street, New York

LET PACKARD TRUCKS SOLVE YOUR HAULING PROBLEMS

Snow and ice complicate your hauling problems. Horses can not cope with extreme conditions.

The efficiency of horse-drawn equipment is least when you need it most. In winter your horses eat more and do less work. You must underload your wagons or overtax your horses.

Packard Trucks will increase your profits by wiping out losses. They will solve your old problems and develop new business. They will work all day and every day. They are efficient in deep snow or on dry pavement.

Your success is ours and our success depends on what our patrons say of our vehicles.

ASK THE MAN WHO OWNS ONE

PACKARD MOTOR CAR COMPANY, DETROIT

When Writing, Please Say—"Saw Your Ad. in the C C J"

Make the
Commerce Delivery Car

The Backbone of Your Business

Progressive and successful truck dealers long ago recognized the necessity of having a well-organized delivery car department.

Experience taught them that the truck business was limited to comparatively few of the merchants and managers in this territory, and that a delivery car department must be added if their business was to show a profit at the end of the year.

Many dealers, however, experienced difficulty in securing the agency of a delivery car that would give all-around satisfaction.

Too many manufacturers depended upon the pleasure car chassis with a delivery car body.

The results to dealer and owner were alike—unsatisfactory service and enormous upkeep expense.

The Commerce Delivery Car solved this difficulty.

The Commerce is designed and constructed as a "fool-proof," efficient delivery car—and nothing else.

The Commerce Car will give twelve-months service to its owner, year in and year out, and its upkeep cost is everywhere proving lower than any car in its class.

The Commerce Car offers you a business that is steady, consistent, permanent and profitable—twelve months of the year.

There is a big market, an accessible market, in your locality—are you going to profit by it?

Write or wire for complete details.

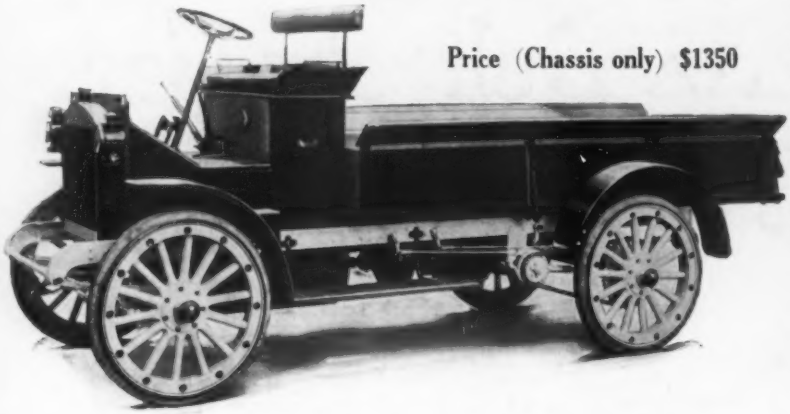
Specifications:

1000 pound capacity, 25 per cent overload guaranteed.
Equipment, including electric lights, horn, complete; windshield, etc.
32 x 3½ Goodyear pneumatic tire, or 34 x 2½ Goodyear Motz truck tire.
Express, full panel, or canopy top.
Clear floor space—
64 inches long;
42 inches wide;
52½ inches high.
Gear ratio—
6 to 1 on high;
20 to 1 on low.
Friction drive.
Wheelbase, 102 inches.

The Commerce Motor Car Company

Administration Dept. **625-630 Penobscot Bldg., Detroit, Mich.**

The New 4-Cylinder "Little Giant" One-Ton Truck



Price (Chassis only) $1350

Here it is—the most dependable one-ton 4-cylinder truck in existence

Aggressive dealers are wanted to handle the Little Giant in unoccupied territory. Those who can qualify will find the connection a most profitable one. The truck is high class in every respect, the materials and workmanship being the best obtainable. It is a good seller, because it is an efficient, dependable performer and its cost of operation and maintenance is slight. Its price is very low, but its value is exceptionally great. This is made possible by the tremendous manufacturing facilities of this company.

The investment required is small, there being but one chassis, to which can be fitted any type of body. The dealer who sells the Little Giant is handling a proven truck which is known everywhere. The Little Giant is backed by an $11,000,000.00 corporation with 20 years of manufacturing experience, and a good will represented by 22,000 satisfied customers. The dealer receives a liberal commission and sales co-operation that is unequalled.

Brief Specifications of New One-Ton Truck

MOTOR—4-cylinder, 4-cycle, 3¾" x 4½". Inclosed valves, mechanically operated, located under seat.

CARBURETOR—1¼" Holley.

COOLING SYSTEM—Thermo-syphon.

RADIATOR—Unusually efficient, special type.

IGNITION—Low-tension Kingston; dry-cell batteries.

LEFT-HAND DRIVE—Center control.

TRANSMISSION—Selective type, three speeds forward and one reverse; Clutch, multiple disc, running in oil and attached to front of transmission case; 3-point suspension.

BRAKES—Service brake, double external contracting, operated by foot lever; Emergency, double external contracting, operated by hand lever.

CAPACITY—2000 pounds.

WHEELBASE—110 inches.

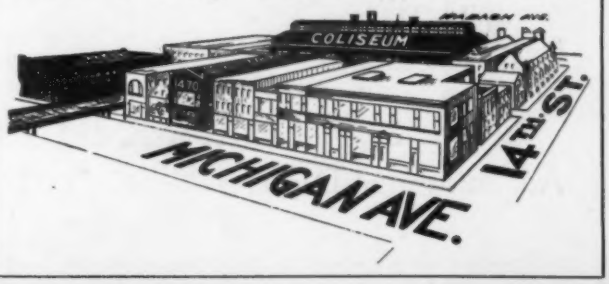
EQUIPMENT—Two oil lamps; tail lamp; tools, and electric horn and full set of mudguards furnished as chassis equipment.

Write us today for complete specifications and territory

CHICAGO PNEUMATIC TOOL COMPANY

1010 Fisher Building, Chicago — **Branches Everywhere** — **50 Church Street, New York**

DEALERS:

The illustration opposite shows our Chicago Sales Room location—very close to the Coliseum. While you are in Chicago to attend the Show, give a moment of your time to the "Little Giant" exhibit at 1470 Michigan Avenue. It will pay you to add the "Little Giant" to your 1914 line. Don't fail to come and see us.

Three Big Chicago Shows